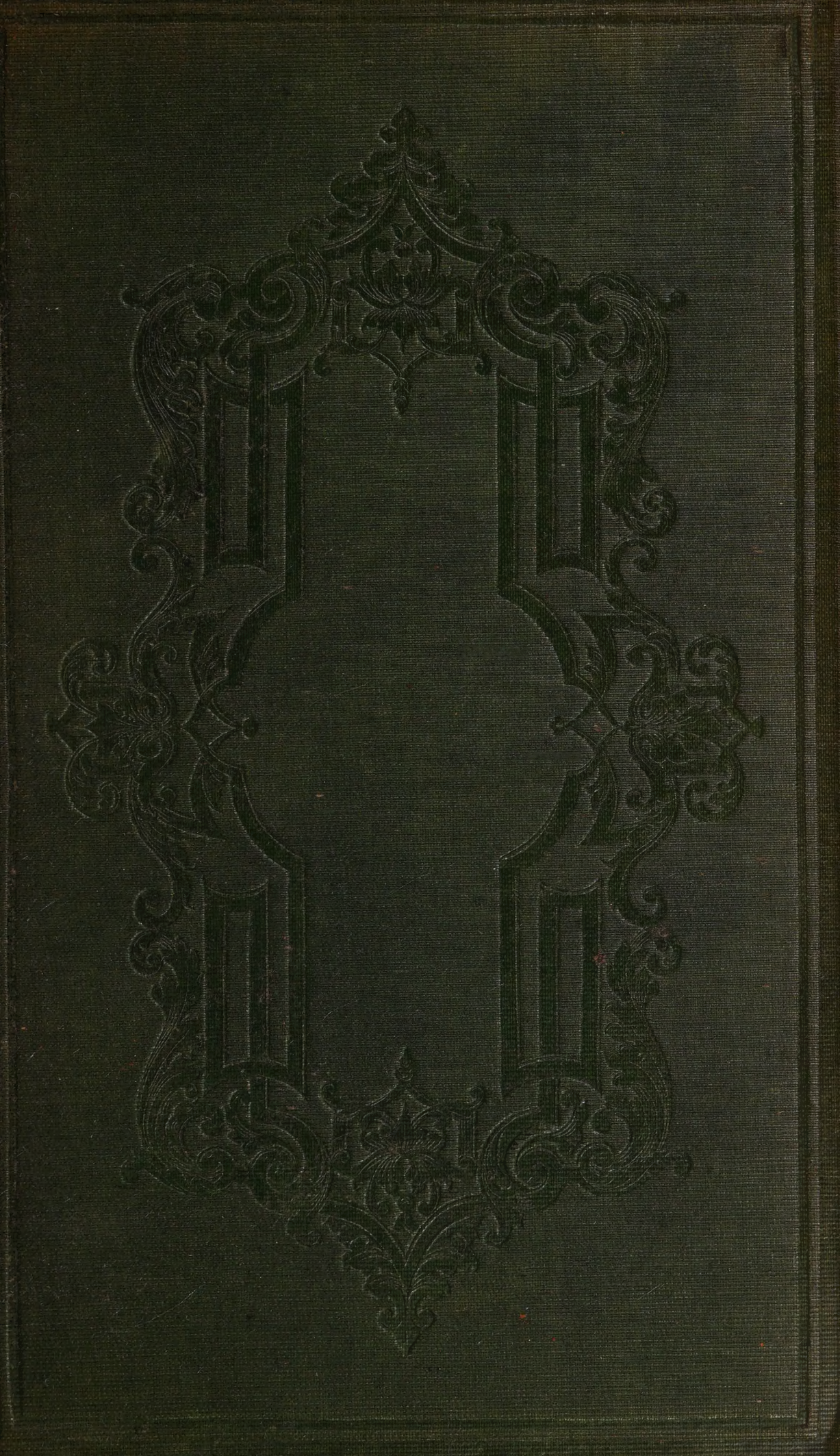

ON SPASM,

AND

OTHER DISORDERS, TERMED NERVOUS,

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MUSCULAR SYSTEM.

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SPASM, LANGUOR, PALSY,

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DISORDERS, TERMED NERVOUS,

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MUSCULAR SYSTEM.

BY

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To the Memory

OF

JAMES WILSON,

THIS VOLUME

IS

INSCRIBED BY

HIS SON,

JAMES ARTHUR WILSON.

CONTENTS.

GENERAL REMARKS.

In the construction of our schemes of rational medicine for the better explanation of the symptoms observed in disease, it would appear that the effects resulting from disorder of the muscular functions have not yet received their due share of attention. While an exclusive importance has been attached by nosologists to the other organized divisions of the body, upon which, as upon the nerves and vessels in their respective systems, all has been made to depend; the structure, by which, in its extent and variety, the operations of life are most developed,—the ever-busy, self-moving fibre,—self-moving, that with it all else may be moved,—the great living mass of muscle, is scarcely ever questioned respecting the origin of the actions that constitute disease, or of those, on which, through the agency of medicine, we depend for its prevention and cure.

It is still with the Flesh, as it long was with the Blood. Both have been unduly neglected in modern pathology; but, as the great common material of the Circulation has at length been admitted to a share in conducting the business of disease, let us hope that the claims of its close and constant associate will no longer

be overlooked; and that the partnership of flesh and blood, maintained in the physiology of all ages, will not be dissolved by the physicians of the present day.

This comparative neglect of the muscle, in the catalogue of ills "that flesh is heir to," finds its explanation partly in the almost exclusive attention that has been given by nosologists of late years to the organic alterations effected in structure by disease; the Morbid Anatomy, as it is termed, of systematic medicine. Few changes are induced in the fleshy structure by disease; and thus, from what we observe by dissection of these organs after death, we are seldom reminded of the importance and severity of the symptoms they may have presented during the various stages of protracted previous illness. Again, there is a disparagement of the entire muscle in the theory which regards its nerve as the sole agent of the influences that determine the contraction of the fleshy fibre, thus rendering a part of the organ paramount in the discharge of the function required from the structure in its completeness and integrity.

Under this prevailing error in physiology, the wide open relations of the muscle with the other parts of the animal frame are continually narrowed and confused; and that which is in truth the most independent of living things, the self-contracting fibre, becomes subordinate in the "system," to the nervous structures, appended and secondary in their nature, with a function essentially representative of actions that never originate in themselves.

Between the blood and the nerve there are at pre-

sent great and contending claims. In practical medicine, as in physiology, the muscle is the arena in which such questions will be best decided. That much of what disturbs the function of the muscle may be transmitted to its structure by the nerve, is of frequent and undoubted proof; in modern pathology it is not so necessary to be reminded of this principle of nervous influence upon the muscle, as to receive a caution against the too frequent application of it.

Disease of the brain or spinal marrow involving the extremities of certain nerves there organized, will necessarily be followed by effects in the structures from which such nerves arise, and of which they form an integral and necessary part. This is especially true of the double voluntary muscles of the body, by the nerves of which, in their common union, the double brain is principally formed, its function being the result of such combination. Thus, from symptoms of disordered or defective action in the muscle, we infer, and often with truth, a disease in the structure or disorder in the function of the brain; but it should be carefully remembered that there may be great disturbance of the muscular function, for which neither the brain or the nerves of the affected muscles are in any way responsible. We are apt to forget that the sensations expressed by nerves seldom originate from the nerves themselves, organs and instruments of sensation though they be; but almost invariably from the combinations of structure in which they severally arise. The greatest disturbance of nervous function is compatible with the soundest

state of nervous structure; for the function of a nerve, which is sensation, is as dependent on the integrity of other structures as of its own.

From within, as from without, from the air we breathe, from the food we swallow, as from the inmost recesses of the most distant structures, there is a channel by which, more directly than by its nerve, most of what influences the muscle is received into its fibre. It is by the continuous universal blood, which, while it bathes the fibre, touches the air and mixes with the food—it is by the blood in mass and in current, that the muscle maintains its great and constant relations with the external agencies of matter as with the elementary texture of every organ in the body.

Let us, therefore, in the enquiry we propose, be content to approach the muscle with the material of its circulation, rather than from the distant sources of its so called "nervous energy."

In rational medicine, as in the physiology of health, the blood, we shall ever find, is our one helping clue. From the blood deficient, from the blood in excess in the muscular structure, a prejudice to its function invariably follows. Spasms, the most frightful, may be induced by the addition of certain principles to the blood; and from the absence of others, the faculty of self-contraction in the fleshy structures may be entirely suspended.

In the explanation of such agencies of the blood upon the muscle, there is no need for the intervention of the nerve. The effects are direct upon the muscle;

and, therefore, upon the nerve, as being one of the parts of its entire organized structure. States of the muscle are necessarily implied by states of the blood. And, upon the blood, let it be remembered, not only in the composition of its material, but upon the blood organized and discharging functions many and various; upon the blood in its "habits as it lives," the muscle is made to depend. Its lively function at once ceases under any great vice of the blood.

There are many states of the blood, not to be appreciated by chemical analysis, which must still be admitted in estimating the influence of this great living agent upon the functions of the muscle.

By chemistry, it is now proclaimed, we are for the future to learn the body through the blood. But it was not from chemistry, let us still, while in its school, remember, that the great functional truths of medicine were first received. Chemistry did not teach us the blood in circulation; or the blood arresting its own current by self-coagulation; the contractility of the blood, or, through it, that of the muscle. Yet from the animal chemist, as he is now employed, it is indeed probable that our greatest gains will henceforth accrue. No longer satisfied with the mere analysis of solid or fluid in limited portions, when dead and out of the body, he infers, by careful analogy, the properties and behaviour of the great living mass in remainder. He distinguishes the elementary principles of blood in the porringer, that he may supply them when needed, as remedies, to its current. But let not fashion betray us. Already the physician has

reason to fear, that in the brilliant precision of these atomic combinations, the less certain results of organic life, when disordered and in action, may be comparatively overlooked.

Not to insist upon the chemical identity of their material, there is the closest analogy between the spontaneous contractions of the muscular fibre and the self-coagulation of the blood. In disorders of the muscle this similarity of function becomes of great practical importance when made applicable to the entire mass of the living blood, continuous as it is in the living body with every fibre of every muscle, whether in action or repose.

And thus, in truth, we find that the agents which, for good or for harm, exercise the most rapid and extensive influence on the functions of the muscular system, are those of which the effect is most remarkable in modifying the coagulation of the blood. Lightning,—the emotion that kills like the lightning,—and certain of the vegetable poisons when most rapidly fatal, seem to destroy by the prevention of the faculty of originating motion that is common to the muscle and the blood. In syncope, and in death as usually produced after protracted struggles, there is a further illustration of states simultaneous in the blood and muscle, and effected by the operation of the same causes in both.

By following out this principle of the direct agency of the blood in the study of muscular disorders, we are led to consider another most important relation between the two great materials of the living body—

that of the re-agency of the muscle upon the blood. States of the blood, it is admitted, imply states of the muscle; and in the full developement of diseased action, the converse of this rule is equally true.

Neither in health nor in disease, is the muscle to be regarded merely as the organ of motion, as ministering only to an occasional and mechanical function; but collectively and in the mass, as the most extensive of living structures, as continually employing and employed upon a large proportion of the entire mass of the blood, thus elaborating the great common material of the body, and preparing it for circulation elsewhere. And this, be it remembered, is true of the muscle at all times, whether in action or repose. It is a necessary result of the elementary business by which the muscle lives and grows; of the common healthy nutrition of its own peculiar structure.

The muscles, indeed, in their constant function of nutrition, are with respect to the blood, as glands; ever busy in separating from it the materials of their own growth, and restoring it in an altered state to the general current of the circulation.

Thus conducted to the inner business of a muscle by its blood,—to the elementary process of its extreme texture by which it lives, grows, and contracts, we recognise in the healthy function of the organ, the same independent power of action which is so remarkable in its spasmodic disorders. Of this separate and self-creating principle of action, there is more evidence in the functional diseases of the several organic struc-

tures than is generally admitted; and in no structure is this faculty more developed than in that of the voluntary muscle. We are over-apt, from local symptoms of pain, from the absence of sensation, from the irregularity or the suspension of action in various parts of the body, at once to infer disease of the great central structures of the nervous system. All living structures are endowed with the faculty of reproducing themselves from the same common material of the elaborated blood, each after its own fashion; and from this distinct and independent process of assimilation in the growing structure, the special function of the complete organ results.

The muscle, like other structures, finds its function where it makes itself; and thus, disorder of its function does occasionally begin in the very process of its own nutrition. In the contractions of the fleshy fibre prolonged after death, as in the spasm that during life defies the will, there is a specious argument for considering the muscles severally, rather as so many distinct animals, independent in their action each of the other, than as consenting parts in the same uniform mass of organized structure.

Under every view of the muscle, it becomes evident that disorder of its function must be studied, in reference not only to its nerve, but as concerning the structure in its entire organization. By the term Muscle, therefore, in our proposed enquiry, will always be understood the living flesh in its combination of many parts, with the blood predominant in all; and

by Muscular Action we shall never mean less than a result of the triple agency of Nerve and Fibre with the Blood.

Unless specially mentioned, the single involuntary fleshy fibres will not be included in the remarks we have to offer on disorder of the muscular function. There can be no direct observation of these structures when disturbed in their action by disease; and their healthy function is not such as to warrant any extensive analogy of symptoms between them and the double voluntary muscles of the outer body. In this respect there has been much looseness of inference, even among practical physicians; by assuming a sameness of behaviour, while under the operations of disease, in the several varieties of the fleshy fibre.

We shall find fitter opportunity to remark on the distinction that obtains between the two classes of muscular structure, in considering the range of their liability to the disturbing influence of spasm. It may here be incidentally observed, that organic alterations of structure occur much more frequently in the pale single muscles of unceasing action, than in those of the double and symmetrical class.

The effect of acute constitutional disorder is generally made evident in the muscles whose function is vital, by the increased frequency of their contractions. They are hurried, rather than convulsed or rendered otherwise irregular in their action, by the influences which prevent in the voluntary muscles all faculty of motion. Thus, in the advanced stage of fever, while the limbs are utterly helpless, and even the nimble

tongue no longer stirs in the mouth, the heart's pulsations will often number 140 in a minute. Again, in the Asiatic cholera, as in the diarrhœa of young infants so closely resembling it, the contents of the bowel will be projected forcibly and repeatedly from its cavity, while the patient is lying prostrate and motionless, with closed eye-lids, from the exhaustion of previous discharges.

In the practical application of these principles to the treatment of muscular disorder, we find that great advantages are actually obtained by addressing our remedies to the muscle through the wide current of the blood that pervades its entire texture, rather than by seeking to influence the structure through the exclusive agency of its nerve. Medicine and disease work, it is ever found, on the same living materials by the same means of living action; and thus it follows, that sometimes by extending the supply of blood to the muscle, sometimes by reducing it, by removing hurtful principles from the circulation, or by restoring those which are inherently wholesome, we do in truth best control the symptoms of muscular disorder.

Cases of Palsy and Chronic Spasm, hopeless if assumed to depend on organic disease of the brain or spinal marrow, are not unfrequently cured by means, that in their effect on the general health redress in the blood what is amiss in the muscle. Great comfort is in such cases brought to the patient by the assurance that the symptoms, under which he suffers, of impaired muscular function, do not necessarily warrant are

inference of organic disease in the nervous centres, with the implied condition of large bleedings, in the routine practice of the day, and of strong mercurial poison for their removal; but that as following in the particular structure of the muscle from what is weak and defective in the general circulation, they will be best corrected by means calculated to replenish the vessels and invigorate the system.

Even where the muscle is least in fault—when its function is impaired by lesion, not of its own structure, but of the brain or spinal marrow—even under these effects of distinct and distant nervous injury, we must in our management of the case still depend on the blood for all that we hope to secure of improvement in the muscle; on the blood, healthy and active in the repair of the damaged nervous structure.

The disorders incidental to the double voluntary muscles of the body are expressed principally by undue violence of their contraction, escaping the control of the will; by their slowness and irregularity of movement; or by the entire suspension of the faculty in which their motion originates. They may thus be classed under the heads of Spasm, Languor, and Paralysis. Among them, in this arrangement, will be found disorders the most chronic and the most acute that afflict the human frame; of which, the symptoms, by their suddenness and violence, obtrude themselves exclusively on the attention of the patient, or are so slow and passive as to escape even the notice of the physician.

The importance of disorder of the voluntary

muscles is estimated, not so much by the actual severity of the symptoms, as by the nature of the function to which the affected muscles minister. Generally speaking, disorders of the muscular structure are urgent, in the degree in which they concern the business of the pulse and the breath. Great interest also attaches to them from the evidence which they afford of disturbance in the general health or of the progress of internal organic disease. Diseases affecting the organization of the brain or spinal marrow, are recognised principally by inefficiency in the muscles which are held by their nerves in connexion with the damaged portion of the central nervous structures.

There is no form of constitutional illness, no alteration effected by disease in any of the internal organs of the body, which does not find its illustration in a corresponding state of the function of the voluntary muscles. Of this principle in practical medicine, fever and poison in their varieties afford the constant proof. Fever, among its very first effects, working by the blood upon the flesh, deprives the voluntary muscles of their tone and healthy power of contraction. The prostration of strength, utter and sudden, with which in some cases it begins—the tossing restlessness, the cataleptic stillness of its later periods—the unconscious struggles that mark the fatal close of the disease, are all so many expressions by the muscle of the poison in operation through the system. In prognosis the most of what we learn from the face is taught to us by its muscles. Thus, from the evidence, in context with other symptoms, of contractile

power in the mouth, brow, cheeks and orbit of those ill with fever, the physician at a glance determines on the general issue, as on the probable duration of his patient's case.

A lady, to whom I was summoned in Hertfordshire, on her way to London, in the winter of 1839, complained of "sudden and severe pain coming in every part of every limb, as if by a blast." These symptoms were accompanied by much constitutional disturbance, and were soon succeeded by severe fever and pneumonia.

In the very remarkable fever which prevailed at Walham Green, during the autumn and winter of 1841-42, there was a special prejudice of the contractile function in certain of the double voluntary muscles. From this cause the abdomen soon became distended, and the breathing was usually laborious. In many cases there was an early and complete loss of voice; which, with other evidence of muscular weakness, lasted long after the abatement of the fever. A young lady, one of a large family, all of whom, with one exception, became my patients under the epidemic, did not utter an articulate sound in the last eleven weeks of the four months during which her illness continued.

Further, it would appear that the effects of fever thus specially determined to the voluntary muscles are in them capable of being modified by the previous habits of the individual. A poor journeyman under my care in St. George's Hospital was observed, while lying speechless and unconscious, to be continually

occupied with a strange uniform movement of the fingers of both hands. This gesture was at once recognised by a fellow-mechanic as imitative of an operation termed "wedging," in their common employment.

In the convalescence of fever, the restoration of the muscular power is the completion of recovery. There cannot be a surer indication of fever in its degree and progress, than is afforded by its effect on the function of the voluntary muscles; and this is true of every state of the general health. Physical life, in its extent and capacity, is best measured by the organic function of the voluntary muscles. When they lose their tone, the health is always found to fail; and of the fibre it may be said, as of the blood, that when it dies, nothing remains alive. Indeed, it may be received as a general principle in disease, that the muscle is necessarily affected by whatever most influences the blood.

Disorders of the muscle, like those of the blood, are endemic, epidemic, and hereditary. Thus, there is in some constitutions a liability to disorder of the muscular function,—a real and special irritability of fibre, which may be transmitted like other peculiarities of temperament by hereditary succession in the blood. The effect of this habit in disturbing and complicating the other symptoms of disease in those who are liable to it, will be best considered with some of the varieties of spasmodic affection.

In particular districts and in certain states of atmosphere, symptoms of disturbance in the muscular

function prevail to a degree not observed, under other circumstances, in the cases of which they form a part. In the northern range of the British dominions, the tetanus that follows wounds is not of uncommon occurrence. Of the undistinguished working vulgar many perish by it annually in our hospitals. But it is not confined to this class. Within the last few years a British nobleman, in the prime of manhood, died of tetanus at his own seat in Kent; and the shock is recent, which was felt through society on the death of the Governor-General of Canada from the same cause. There was a dismal resemblance in the character of this last case to the hydrophobia, under which a preceding governor of the same province had died, not many years before. In the West Indies, and in South America, tetanus, both of the traumatic and idiopathic kind, is a very frequent disease; in Grand Cairo, we are informed by Clot Bey, that it is at present scarcely known.

The voluntary muscles, moreover, express in their varying condition many important states of the general health; not actually those of illness, but which being known, illness may be anticipated and prevented. These indications of weak or of bad condition of the system, well appreciated by the nurse and the trainer, are not sufficiently considered by the physician.

Between the skin and the voluntary muscles there is a close relation of function, which finds many illustrations in the disorders to which both structures are liable. The remark is equally applicable to coincident or vicarious states of the muscle and of the mucous

membranes. In the explanation of such effects following in the muscle from causes in operation either on the inner or on the outer surface of the body, the intermediate agency of the blood, necessarily affected in its properties and composition, should ever be remembered. Muscular symptoms, it may be remarked, abound in the present age of excitement and corresponding exhaustion; for all influences of this kind are determined through the blood to the muscle, and there by its nerve felt and expressed.

There is a further reason for the close practical study of the voluntary muscles by the physician. In cases of assumed illness it is by these structures that the multifarious symptoms determined at will by the patient are principally expressed; and thus, a knowledge of the laws that govern the contractile function in its range and variety, will often suffice for the detection of the most practised impostor.

SPASM.

Of disordered action in the voluntary muscles, Spasm affords the most direct illustration. Its symptoms, by their painful severity, and by the local disturbance which they necessarily occasion, are frequently obtruded on the notice of the sufferer, to the exclusion of others of more real and urgent interest.

By analogy with the healthy function of self-contraction, Spasm is assumed contingently of the fleshy fibre wherever it is known to exist. What is seen and felt of perverted action in the great double masses of flesh beneath the skin, is inferred of the hidden, unmatched, insensible fibres by which the blood is circulated and the food propelled. It is a question of great practical importance, how far such influence is warranted. Spasm is a vague term in medicine; yet as implying, in its widest sense, a sudden and involuntary action of the muscular fibre, it can hardly be asserted of structures, which, as they are never subjected to the will, cannot act in disobedience to it; and whose actions, sleepless and constant as life itself, are ever varying in degree with the impulse of distension by which they are induced. While spasm, in its origin, is by most physicians considered as depending almost exclusively on the nerve of the affected muscle, and spasmodic disease is consequently encountered in treatment by the most powerful stimulant and narcotic principles, known in medicine as "nervous" remedies, we cannot

be too cautious in classing symptoms under a term of such important consequence to the patient; especially in cases of implied disturbance of the great functions of assimilation and circulation.

The observations which follow, will therefore be understood to apply exclusively to those muscles of the body which are double, symmetrical, capable of sleep, and ordinarily under the influence of the will. There is much more spasm among patients and in medical treatises than in disease as it really exists. Cullen's doctrine of Fever is made to rest on a spasm of the extreme vessels, in which no one now believes; and, from those who consult us, we often hear of spasm in structures where no muscular fibre has as yet been demonstrated by the anatomist.

Spasm, in all cases, excepting those of direct local injury, implies a further effect of disorder in the system than is expressed by the irregular contractions of the affected muscle. That convulsions will follow on the injury of certain nerves, or of their corresponding portions of the brain and spinal marrow, is of familiar proof; and the physician, remembering this principle of disease, will often see reason carefully to examine the structure of the nerve in its entire course, from its origin in the fibre of the affected muscle to its final organization in the great anatomical centres of the nervous system.

It is not, however, by organic disease of the brain, or by tumours pressing on the nerve, that spasm is for the most part explained. The worst forms of spasm seem to have least to do with the nerves of the

affected muscles, and are compatible with the soundest state of their structure. Indeed, when spasm kills, we rarely learn, by dissection of the "Nervous System," how death is brought about.

On the other hand, large portions of the brain or spinal marrow may be slowly disorganized with no effect of spasmodic contraction in those muscles of which the nerves are continuous with the damaged portion of the medullary column. As generally observed, organic alteration of the nervous structure seems rather to suspend than to disturb the function of the muscle; inducing, not spasm but paralysis. Excepting where its effect is immediately to arrest the pulse and breath, the importance of spasm is measured not merely by its severity; but rather by the circumstances and general context of the case. Thus, in the sudden seizures, by Fit, of unconsciousness with loss of voluntary power, if general in the limbs, Spasm gives a distinctive and favourable character to the case; which the physician is better pleased to consider as one of epilepsy than of apoplexy. Again, the slightest stiffness or irregularity of action in the muscles of the throat, if observed a few days after the bite of a rabid animal, or after lacerating wounds of the extremities, would fix our most serious attention, as threatening the horrors of tetanus or hydrophobia. In the case of a patient now under my care, who has for two years past been subject to frequent attacks of nocturnal epilepsy, a gradually increasing sensation of compression across the upper part of the throat, occasionally accompanied by actual rigidity of the muscles there

employed, seems to warrant the belief of structural alteration in the brain, or its investing membranes, as the existing cause of the functional disorder.

Of the undue relation effected by the disturbing influences of Fever between the blood and the muscular fibre, spasm is one of the results. It is often a symptom, sometimes a predominant one, of febrile disorders; impressing them from the muscle with a character as distinct as that which they receive at other times from impaired function of the brain, the lungs, the serous or the mucous membranes.

As far as my own observation extends, I have generally found that the fevers, in which spasm is an early symptom, become eruptive in their progress. In the instance of a young gentleman to whom, in the spring of 1838, I was summoned, under an attack of incipient fever, in one of the boarding-houses attached to Westminster School, all the great muscles of respiration were affected by spasm so frequent and severe, as at once to suggest to the late Mr. Seaton and myself, the possible case of tetanus establishing itself in sequel of some local injury. In a few hours from our visit the convulsed muscles became quiet, and the case was recognised as one of varioloid fever by the eruption characteristic of that disorder.

During the summer of the same year, many cases that fell under my care of the spotted epidemic fever, were further remarkable for tremors of the limbs, with other symptoms of disturbed muscular action. This prominent character of the fever then prevalent in London, was very strongly developed in the case

of a journeyman house-painter, acknowledging himself to have been a free liver, who became my patient in the hospital. Three several poisons of fever, paint, and alcohol were in simultaneous operation through the blood on the muscles of this man.

A young gentleman, residing in Sloane Street, Chelsea, was attended by me in the spring of the same year, during an attack of fever, in which, for a time, spasm of the thoracic muscles was the prominent symptom. A medical friend was attacked, when of mature age, by fever with severe and extensive spasm of the voluntary muscles. The alarm occasioned by those symptoms was at once dispelled by a timely eruption of the chicken-pox.

In a most interesting Report by Dr. Southwood Smith of an illness which prevailed periodically, and under different forms, for many successive years among the children of a large female school situated at the back of Euston Square, it is stated that spasm of the voluntary muscles took its turn with ophthalmia, obstinate constipation, and typhoid fever, in the development of the constitutional poison.

Certain individuals betray this irritable condition of the muscular fibre under all circumstances of disturbance in their general health. A fit of indigestion, —an attack of catarrh,—a burst of strong emotion, will in them give occasion to immediate symptoms of irregular muscular action.

In the case of a gentleman between fifty and sixty years of age, who fell under my care in the autumn of 1840, there was a good illustration of this peculiar

spasmodic tendency. The symptoms for which I was first consulted had remained in sequel of the influenza of 1837, and were supposed to depend on a thickened state of the mucous membrane of the larynx, on which an undue strain had been made, by loud speaking, in the discharge of public business. These catarrhal and asthmatic symptoms were soon complicated by spasm of the laryngeal muscles with darting pains and irregular contractions of the double muscles of the chest and upper extremities.

Some months previously to this attack, the accidental cut of one of his fingers had been followed by spasms of the arm and neck, described by the distinguished surgeon who then attended him as exceedingly severe and "tetanic." The subject of this case has been always distinguished for symmetry and robust beauty of frame.

In the spring of the same year, a lady consulted me for the relief of painful spasms affecting both sides of the body, which recurred generally at night, and with such severity as entirely to prevent sleep. The muscular symptoms were accompanied by much habitual disturbance of the stomach and other organs of digestion, and were generally relieved by the use of strong aperient medicine. There was likewise severe urticaria in this case, and the complexion was often suffused with a dusky orange tint. The patient was a married person, aged forty-eight, of a full tall figure, and enjoying good general health with the exceptions that have been mentioned.

I have selected the two first cases from many

others of which I have preserved notes, as sufficiently illustrative of the effect of spasm in particular muscles from causes influencing the general circulation.

In shaking palsy, induced by mercurial poison, the spasm is of this pervading kind. It is but one symptom among many of the constitutional disease, and is associated with evidence of disordered action in every part of the system. The exposure of two individuals to the same vapour of heated mercury, during a single night, was followed by most severe and protracted salivation in one case, and in the other by universal tremors of the voluntary muscles, which lasted during life. This is related by Dr. Christison, in his excellent *Treatise on Poisons*, on the authority of Mr. Haidinger.

After a conflagration, some years back, in the quicksilver mines of Idria, by which the metal was extensively volatilised, nearly a thousand persons employed in the works were affected by excessive tremors of the limbs, with salivation and other symptoms of the mercurial poison. The spasmodic contraction of the muscles was in some instances so violent, as to compel the sufferers to throw themselves upon the ground to escape the fear of falling. Similar effects were observed in the crew of a homeward-bound ship from South America, laden with a cargo of quicksilver, which had in part escaped and was sublimated between decks during the latter period of the voyage. A large proportion of the labourers employed in the quicksilver mines of Almaden suffer,

it is well known, from convulsions, continual agitation of the limbs, and paralysis.

The great results of spasm and paralysis induced by lead in the voluntary muscles, are never more rapidly developed than in those who are compelled to inhale its vapours.

An instance has more recently fallen within the writer's knowledge of spasmodic movements, severe and protracted for many days, in the limbs of an elderly person remarkable for physical activity and sustained energy of intellect. This disorder in the contractile function of the voluntary muscles supervened on great mental exertion, under circumstances peculiarly harassing to a temper naturally irritable.

The convulsive movements, by which sleep was for some time prevented, exactly resembled those of chorea, affecting, as in most cases of that disease, by preference, one side of the body. They were associated with pain and disturbance in the functions of the larger bowel, and gradually yielded under measures calculated for the improvement of the general health. Long after the subsidence of the more violent symptoms, the patient was distressed by frequent twitching of the flexor muscles of his toes and fingers.

Women, inheriting this peculiar spasmodic temperament, are, during their menstrual period, especially liable to irregular contractions of the voluntary muscles. The same remark applies to these females on their passage through the middle term of life. A lady now under my care, who was more than once attacked

by chorea in early youth, is suffering at the critical age of forty-eight, from frequent spasmodic aphonia, with urgent difficulty of breathing and inability to swallow. Her teeth are, at other times, forcibly set together by a "clasping of the jaws;" so that she is haunted by a perpetual dread of tetanus or of St. Vitus's dance.

Two sisters, enjoying by right of descent the highest order of talent, have both recently assured me, that anxiety or other vexation of mind almost invariably subjects them to great physical discomfort by irrepressible twitchings of the hands, arms, and legs.

CRAMP.

Of true spasm in the double voluntary muscles, Cramp, commonly so called, affords the best illustration. It is sudden in its coming and going; it is violent and unduly protracted,—it is an effort of the muscle with no known object, and the pain by which it is accompanied, sufficiently declares that it is an effort made against the will. The cause of the pain, which seems to give a distinctive character to the spasms of which it is a symptom, is not easily surmised; for, by no voluntary action of the muscle, however forcible and prolonged, can it be induced. It may possibly depend on the contraction in opposite directions of unequal segments of the affected muscle. There is no form of spasm that seems to attach more distinctively to certain individuals than this of cramp. Some persons pass through life, scarcely knowing what it is; while in those who are liable to this disorder, it is developed by causes, however slight or remote, that in any way disturb the general health. What "flies to the head" or to the chest, in common phrase, with many, becomes cramp of the extremities in those who inherit the spasmodic temperament.

Cramp, in the large majority of cases, is associated with other evident symptoms of disordered action. It can seldom be considered as idiopathic, and perhaps in truth is never so. There are cases on record of violent and painful contractions of the voluntary muscles, not apparently connected with any constitu-

tional disturbance; but I have never met with such instances in my own practice. A lady whom I attended in the summer of 1840, for symptoms of failing digestion, assured me that the slightest voluntary movement in any of her limbs occasioned extreme pain to the muscles so employed; but this patient soon afterwards became insane, and died under the influence of various delusions. Painful contractions of the voluntary muscles often remain in sequel of the use of opium, and are made an excuse for the further use, by increased doses, of the drug.

The symptoms with which cramp is associated are occasionally of the most severe and alarming kind. In tetanus, in the Asiatic or common epidemic cholera, in some fevers, and in the operation of certain poisons, it is coincident, or alternates with states urgent as those of inflammation of the lung and bowels; with syncope and with apoplexy. In such cases its severity is generally in a direct proportion with that of the disturbance in the functions of the vital organs. Spasm is for the most part assumed to depend on direct pressure or irritation of the nerve of the affected muscle; or on an effect of this kind conveyed to the nerves of the muscle from the nerves of distant organs. It is difficult to account for this exclusive preference of the "nervous theory" among medical men in all that relates to spasmodic action. It does not obtain from what is actually observed of the effects of disease in the nervous structures; for the brain may be disorganized by alteration, slow or sudden, of its substance, to the utmost extent com-

patible with life, without any direct effect of spasm being thus induced in the voluntary muscles. In the majority of cases which have fallen under my care of disease of the brain, there is no record of spasm as frequent among the symptoms observed during life. It is not necessarily induced by abscesses or tumours in the substance of the brain, or by bony matter deposited in its membranes.

In a brain which Mr. Samuel Lane examined at my request in the autumn of 1831, an abscess was found occupying the greater part of the middle and posterior lobes of the right hemisphere; it had communicated by a small opening through the dura mater with the right lateral sinus, and had finally burst into the central ventricular cavities, which, with the lateral sinus, were filled with yellow pus.

The subject of this case was a young gentleman about twenty-five years of age, of tall athletic make, who had led a gay and active life until within a few days of his death. During the previous six months he had at times complained of severe pain in the back of the head and neck. Neither spasm nor hemiplegia had been observed by his family, or by the late Dr. Warren, under whose care he had been placed.

In the winter of 1819-20, I examined at Naples, with the late Dr. Milne of that city, the head of a young English gentleman who had died apoplectic, after an illness of a few hours, having danced at a public ball only two evenings before the fatal event. A great part of the vertical falciform process of the dura mater had in this case been converted into bone, but I

could not learn that any symptoms of irregular spasmodic action in the muscles had ever been observed during life.

In the case of a little girl aged ten, who died on January 23rd, 1843, in St. George's Hospital, the left hemisphere of the cerebellum was entirely disorganized by tubercular growths in its cortical structure, with a diffluent softness of the intermediate medullary substance. There was much similar disease in the right hemisphere of the cerebellum, and all the ventricular cavities of the brain were largely distended by limpid fluid. Yet, in the course of three weeks, during which the case remained under my care, I never once observed the least spasmodic movement in any of the double voluntary muscles of the trunk or extremities. Once only, the nurse reported a fit of unconsciousness with sudden and complete rigidity of the limbs, which was subsequently considered to have arisen from pressure of the healthy brain by the effused fluid, rather than from any direct agency of the tubercular accretions in the cerebellum. The little patient was blind, with dilated pupils, and lay, by choice, profoundly still; but her apprehension was quick, and her articulation was always distinct.

Disease of any one portion of the brain seldom induces spasm in the particular muscles which, by their nerves, are directly in connection with such diseased portion. It is not by spasm; but by numbness, by loss of power, sensation and motion, that the effect of such partial damage of the brain is, for the

most part, made evident in the function of the corresponding muscles. There is, indeed, a presumption in favour of the soundness of their nervous structure, in the muscles that are affected by spasm; for a muscle, of which the nerve is disorganized, must be paralysed, and cannot be cramped.

Half-drowned persons, in being brought to life, on the recovery, that is, of consciousness and sensation, are not unfrequently attacked by spasm of the voluntary muscles, violent and lasting in a degree proportioned to the duration of the period of their submersion. These secondary convulsions are generally attributed to congestion with reaction in the brain. It should, however, in such cases be remembered, that the entire blood of the body is directly influenced in its properties and composition from the first moment of the interruption of the respiratory function; and that the effect of such altered condition of the blood would not be less immediate in the fibre of the muscles, than in their particular nerves, or in the common brain.

In most cases of cramp, no direct pressure or irritation of the nerves of the affected muscles can be proved to exist. Yet, if a cause of this kind be known, or even suspected, it is deemed all-sufficient for the production of spasmodic action to any extent in the neighbouring muscles. Pregnant women suffer occasionally, it is well-known, from cramps of the lower extremities; but it should be remembered, that in the process of gestation the general health is involved, and that the muscle is thus brought under

influences affecting it in its entire structure, from which, in their effect on the blood and the fibre, spasm may ensue with as much likelihood as from pressure by the enlarged uterus on the trunk of the distant nerve.

Much of what is endured by women as "spasm of the stomach," is, in truth, the expression of disordered action in the uterus or its appendages. Painful menstruation is often thus described; and extensive disorganization of the uterus has, under this phrase, been concealed by the sufferer from the enquiries of even her medical friends. Indeed, the patient herself, in such cases, is thus not unfrequently lulled into comparative security; and the more readily, as spasm of the lower abdominal muscles does at times follow, as a real effect, from the progress of uterine disease.

In a large number of abdominal and pelvic tumours that have fallen under my observation, few have been accompanied by cramps, in any marked degree; and where such symptoms have been remarked coincidently with the growth of the tumour, there has been abundant evidence of impaired nutrition in the structure of the affected muscles. If cramp, in such cases, be sometimes occasioned by pressure from the tumour, it is from interruption of the current in the large blood-vessels, rather than by compression of the trunk of the nerve, that such effect follows in the depending limbs.

Spasm or cramp is seldom occasioned by direct pressure or irritation of the nerve of the affected muscles; and never, I believe, by irritation conveyed

to them from the nerves of more remote structures, independently and exclusively of the effect of such irritation on the circulation and general structure of the muscle. It is from what offends the blood in the fibre, that spasm of the voluntary muscles is for the most part induced. By no contrived irritation of the ganglionic nerves can we directly induce spasm in the voluntary muscles; let, however, but a few drops of the solution of extract of the nux vomica be injected into the current of the living blood, and tetanus is the certain result. There are no cramps so severe as those of which poison mixed with the blood is the direct cause. Can we refuse the inference, that always in the muscles, when thus disturbed, there is a prejudice of the blood by composition or in function;—and by the blood's function how much is implied!—how much more than the little we know of it by its material composition, or in its mechanical relations! This has not been enough considered. The blood not only lives, but its life predominates over that of all else in the system. It lives in the mass, as in the particles; as an organ, that is, with a combined function; as an organ, therefore, universal in the body; for the blood in the living body is everywhere,—and everywhere at once. As the air surrounds us from without, so does the blood pervade us, like an atmosphere, from within, receiving and transmitting influences through its continuous mass which are acknowledged in all parts of the system. Most of what is effected by the blood is thus brought about; not by direct admixture of material principles with its current, and the subsequent

transport of such principles to the several organs; not by chemical agencies thus conveyed; but by action inherent in the blood itself, rapid and universal as electricity, and, like electricity, occasionally developed by the mere contact of certain forms of matter, or by agencies that are immaterial.

Let it not be supposed that such influences are incompatible with the functions of the blood, because they have not hitherto been reduced to the laws of its circulation. We rest too exclusively, in these latter days, with deference be it observed, on the one great truth declared by Harvey. In physiology, as in rational medicine, we seldom suffer our enquiries respecting the nature and business of the blood to range beyond the limits of what is taught of its passage, in successive portions, through the vessels; but there are active states of the blood which are independent of the movements communicated to it by the heart and arteries; and it is capable of influences universal and instantaneous, which far outstrip the measured pace of its circulation.

It is not so much from what is added of material to its composition, as by what it receives of impulse to its action, that effects follow from the blood to the system. Cramp is among these effects; which are most frequent in the structures, where, as in the muscle, the blood is most abundant. Self-moving, self-producing,—maintaining its own fluidity,—arresting its own current by self-coagulation, the blood, in its wide range of capacity, is affected directly and at once by the countless agents of vital impression. Hence, from these varying states of blood in the flesh,

proceed the various symptoms of disturbed action usually termed "nervous," in the voluntary muscles. This phrase should never be admitted but with a careful reserve; for it is often calculated practically to mislead.

Much of the importance with which of late years the nerves have been unduly invested, has been borrowed from the muscles at the expense of the blood.

The vital consequence to the blood in its composition and composite function, resulting from the number and quality of its particular ingredients, has been practically demonstrated by Dr. Stevens, in his treatment of West India fevers. It has, of late years, been more elaborately considered, and, with other great truths, established by the laws of atomic combination, in the published lectures of Mr. Ancell on the Blood. It is matter of sincere gratification to the author of this treatise, that as a teacher, he has been closely associated with the two men, who by their writings, have done earliest and best service in this country, to the school which now rules us through the blood.

In the practical application of these principles to the study of disease, we find that spasm of the voluntary muscles does frequently occur, as a result of disordered action in the organs by which the blood, in its composition and properties, is most influenced. Partial organic disease of the brain does not, it has been observed, necessarily induce spasm in the corresponding voluntary muscles. Spasm, however, does occasionally follow, as a consequence of partial disorganization of the brain, in muscles which are not

immediately connected with the damaged portion of the central nervous structure. The spasms incidental to tumours of the brain, and to the apoplectic fit, are, for the most part, of this kind. In a case which I attended, with Mr. Laisne, of Eaton Square, in November, 1835, and which ended fatally in twelve hours from the attack, the muscles of the left side of the body were strongly convulsed by spasm, recurring in fits, while the right side remained entirely without motion. On an examination of the brain after death, the left corpus striatum was found to be completely disorganised by blood effused into its substance; the opposite side of the brain was sound in structure. The subject of this case was a distinguished naval officer, about fifty years of age. He had long previously suffered from headache, with other symptoms of disturbed health, and was at last struck down by apoplexy while he was shaving, so suddenly that he fell beneath the dressing-table with the razor in his hand.

It remains a question in these cases of spasmodic apoplexy, whether the forced contraction of the muscles be induced by a direct effect of pressure or displacement of the sound portions of the brain, with which those organs, through their nerves, are connected. In the purely epileptic paroxysm, (and the spasm of apoplexy is in its character epileptic,) the temporary disturbance of the circulation in the brain, upon which the irregular action of the muscles seems to depend, is in most cases an effect from causes directly affecting the general current of the blood in its volume and composition.

VARIETIES OF SPASM.

SPASM OF THE CHEST AND STOMACH.

In most cases of severe spasm, the symptoms under which the patient suffers are by him referred to the lower breast or epigastrium. There is an instinct protective of this central region of the body, in all who respect the principle of life in themselves and others. Hence proceed the great common impulses of movement to structure in all its divisions,—here, it is felt, the authority of life is lodged; and here, consequently, is most disturbed by disease. Where all is in motion, the expression of what happens under illness is necessarily shifting and sudden; symptoms intermit, and pain, when suffered, is spasmodic. This latter phrase will be received with great limitation by the physician, in its application to disorders of the chest. There is much that moves beneath the sternum, besides the muscle: blood and breath, food and flatus, there hold their passage, and maintain their current; if with difficulty, then by spasm, as it is generally expressed. The muscles, moreover, that are here assembled, are many, and various in their kind; obeying very different laws in their function of self-contraction.

Here are the thick, fleshy chambers of the heart, multiform in its divisions, untiring in its action, ever varying in its capacity; and here, the double, symme-

trical, voluntary muscles of the trunk of the body converge through the diaphragm into the single irregular fibre of the organs of digestion and assimilation. Spasm, as understood of one or other of these structures, necessarily implies a very different idea.

In seeking to explain the effects of spasmodic disease, real or supposed, in the lower breast, the great central structures of the circulation are seldom overlooked. Strange, that the attention which is given to the vessels, should be withheld from their contents. Even in the passive results of weight and pressure from its local congestion, the blood is not enough considered in the pathology of spasm: but in the operations of functional disorder, the blood is not merely passive and subordinate; it originates its own actions,—it maintains its own current,—it is self-contracting, self-expanding, like the flesh which it creates; it is an organ, vital and with a function. In the large masses of blood that assemble in the centre of the body, there must at times be much, that being amiss, is felt and expressed by corresponding symptoms. The sense of weight and constriction beneath the ensiform cartilage, the anxiety and many other sensations of peculiar uneasiness referred to the præcordia during a paroxysm of "spasm in the chest," are, I am inclined to think, but so many evidences of the blood in undue volume or of unfit quality in the large central veins and arteries. There are many sensations felt, by thrill and shock, instantaneously and simultaneously through the system, which begin

and end with the blood in its general mass and current.

This, indeed, seems to be the way in which passion and strong emotion work upon the human frame. Their immediate effect is felt in those parts of the body in which the blood is collected in the greatest abundance; they are further made known by the flushed or pallid cheek, by the bloodless lip, by the glaring brightness or dim suffusion of the eye. These physical expressions of human feeling have been best noted by the two men to whom, in their respective ages, man's nature was practically and thoroughly known, by Horace and by Shakspeare. It is not necessary to admit the nerve to any share in the explanation of these wide and sudden sensations; for the blood is sentient of its own states, as it is inceptive of its own actions. Why should we suppose, in such cases, an agency of the nerve, intermediate between the material affording the impression, and its physical effects first observed in the blood? Is any thing in the body nearer to external influences, than the blood; spread out as it is in the lungs, in direct contact with the air, and with all that the air contains? Can this be affirmed of the Nervous Structure in either of its great divisions; of the double symmetrical nerves, or of those forming the ganglionic system?

There is but little true spasm of the chest. What is commonly so designated, is for the most part a violent yet healthy and necessary effort of the muscles of respiration, when tasked with unusual difficulty in

maintaining their function. In all such cases the cause of the distress is in great measure of a mechanical nature. It is first observed on walking; or it is felt only in certain positions of the body. On dissection, it is generally found, that the symptoms have in truth depended on organic changes of structure in the chest, inducing weight and pressure in undue directions. It is not within our present enquiry, to consider the pathological varieties of dyspnœa; of which it will be sufficient to remark, that it is necessarily induced by whatever obstructs the passage of the blood through the chest. By rash interference with the labouring action of the muscles at these most critical periods of existence, many lives have been brought prematurely and suddenly to a close. Yet no cases admit of more decided and immediate relief than those which are marked by "spasmodic difficulty of breathing." Persons apparently at their last gasp, having struggled against suffocation for days and weeks in succession, will, under certain agencies of medicine, at once recover their breath, and be restored to a state of comparative comfort. Æther is known to physicians principally by the relief which it affords in disorders of the breath; and opium owes much of its reputation to the antispasmodic power which it is supposed to exercise in similar cases. The wonderful alleviation afforded by certain medicines in these cases, does not follow from any effect directly induced by them on the muscles of respiration; for the muscles, we have seen, are not in fault, but contract forcibly and laboriously on a necessity felt and urgent within.

Under the use of the medicines known as "nervous" and "stimulant," their contractions in many cases become more easy and less frequent, from the removal, not of spasm in their fibre, but of the obstructions, against which they are contending in the cavities of the chest. It is not by any known agency of the nerves, that we are enabled to explain the relief afforded by medicine in spasmodic disorder of the chest. By influences directly exerted on the masses of blood in the chest, we should best effect an alteration in the relations of the blood with the air; and thus, I have always thought that recovery of the breath from a paroxysm of dyspnœa is for the most part brought about. That the blood admits of such influences in the mass, we know by what we observe of this material in its varying states of colour and consistence both in and out of the body. On the way in which such medicines as those which we are now considering may be supposed to influence large masses of the blood, it would be idle further to speculate; but we may venture to suggest, that both the disorder in its symptoms, and the remedy in its action, may in great measure be determined by influences affecting the volume of the blood through its gaseous or aëriform principles. Between the blood and the air in the lungs there is, it will be remembered, a continual interchange of principles, by which both currents are affected in their volume and composition. From changes, therefore, effected by medicine in the blood, new states of air, chemical and mechanical, are induced in the lungs; directly influencing the business

of respiration. This reagency of living matter upon what surrounds it, affords a most interesting subject of inquiry to the philosopher: yet, hitherto, it has been but slightly considered by those who are best able to appreciate its importance. We should much better understand how foreign agents affect living things, if the converse of this enquiry were more frequently present to our minds.

On the principle of reducing the general volume of the blood in circulation through the vessels, I have often directed the use of the hot-air bath in cases of protracted and urgent dyspnœa. This great remedial agent has appeared to me especially useful where the disorder of the breath has been associated with evidence of renal anasarca. In such cases no relief to the symptoms is obtained from the diseased kidney by medicines of the diuretic class; which, failing to promote the urinary flux, aggravate both the dropsy and the dyspnœa. There is this great advantage in promoting the vicarious excretion of the skin by the hot-air bath, in cases of internal glandular disease, that no new disturbing principle is thereby added to the vitiated blood already in circulation.

SPASM OF THE DIAPHRAGM.

Spasm of the diaphragm is a phrase in common use among physicians to express certain urgent conditions of the pulse and breath. Yet, though probable by analogy, it is by no means of direct proof that spasm of this unique muscle can be admitted as a true pathological state. Our knowledge of the diaphragm in its healthy movements is so limited, that we have little right to pronounce upon its behaviour when irregular, or under circumstances of supposed disorder. It is strangely assumed by anatomists, with the muscle spread out beneath their eye, that its full contraction is needed for the effect of a complete inspiration. No better means could in truth be devised in the mechanism of the chest, than the shortening of its fibres, for the more effectual expiration of the breath. When the tendinous centre of the diaphragm is fixed by the contraction of its lesser muscle, the ribs are brought together, downwards and backwards upon each other, and the sternum is made to approach the spine, by the simultaneous grasp of its lateral and anterior divisions. A little space is gained vertically by the occupation of a somewhat lower level than would remain with the fibres in their passive state; but where the chest is broadest and widest, there its area is most reduced by the contraction, whether healthy or spasmodic, of the muscle which forms its base.

SPASM OF THE TRUNK AND LIMBS.

We have already seen, how, from the external agencies of fever, and of other poisons, convulsions may be induced in the voluntary muscles. Similar effects frequently follow from those varieties of internal organic disease which in their progress affect unduly the blood in its volume and composition. From organic disease of any of the single vital structures of the body, spasm may be induced in the voluntary muscles; and this without apparent prejudice to the functions of the brain; for there are many states of the blood by which the relations between it and the muscular structure are disturbed, which, nevertheless, are not inconsistent with the faculties of sensation and consciousness.

Samuel Johnson, when struck by palsy in the night, composed a mental prayer in deprecation of insanity, which he was unable articulately to repeat.

We find in tetanus, that, during its most violent effects of spasm, consciousness and sensibility remain; and often in a very aggravated degree. On the other hand, there may be entire loss of consciousness and sensation, as in most cases of apoplexy, with no spasm of the voluntary muscles. In the epileptic paroxysm, spasms, violent and frequent, are associated with entire insensibility. In the spring of 1841, I attended, with Mr. Tegart, a gentleman, rather advanced in life, who had been attacked early in the afternoon by spasm of the voluntary muscles, with loss of con-

sciousness. The convulsive paroxysms continued, with great violence and frequency, until a late hour of the evening; and, in the interval of their recurrence, the patient remained in a comatose state with stertorous breathing. On the following day he was sitting up, nearly free from all symptoms; and on the fourth day from his attack, I met him walking, and unattended, in the public streets.

In the summer of 1840, I was consulted respecting the health of a young gentleman, aged fourteen, who had for some time been subject to fits of a peculiar character. They happened always at night, and were generally preceded by tremors and twitchings in various parts of the body, with a vague dread of what was to follow. The paroxysm, which was sometimes delayed by hours of speechlessness, was marked in its accession by sudden and complete rigidity of the arms, legs, and face, with profound unconsciousness. The state of the affected muscles was described by his intelligent attendant as one of stiffness rather than of spasm. The eyes remained open, and were red and wild. During the fit, and for some time afterwards, the patient talked incessantly and incoherently. On one occasion, while he remained under my care, after the usual premonitory symptoms in the early part of the night, he exclaimed suddenly, "I am going—rub me—'tis too late—I am gone!" and then lost all command of his mind, as of his muscles. The tongue was not bitten, and the speech never failed in these attacks. The boy was considered "well" in his general health by those about him; but there was evidence,

in the cracked angles of his lips, in a partial opacity of the cornea, and by other analogous symptoms, of a weak strumous habit of body.

There is no state of the "nervous system," in its structure or function, as generally understood, with which spasm of the voluntary muscles, however violent, is not compatible. Cæsar, great Julius, rose from earth-bound fits, again to command the world; and he, the foremost among living men, like Cæsar, in these unconscious struggles, still triumphs over himself.

SPASM OF INFANTS.

The spasm of infants always deserves our full and careful attention; for by it are expressed some of the worst forms of illness to which they are liable; yet there is much and frequent irregularity in the muscular contractions of very young children, to which, though designated as convulsive, no serious consequence attaches. In the first months of infant existtence, the vital powers, if the expression may be used, appear to be determined principally to the structures by which, when complete in their function, the means of life are provided, and its end secured. The muscle, at this early period, maintains the most lively relations with the external agencies of matter, as with the internal business of the body. Its contractions are irregular, because uneducated; yet, without further prejudice to the functions of the brain than would be

inferred from the prolusive movements of the fœtal growth that leaps within its mother's womb. The faculty of self-command, inherent in the voluntary muscle, with its harmony of movement in the double symmetrical body, is only acquired by a long course of practice, and after the experience of repeated failures.

The time was,—we are scarcely yet removed from it,—when, on a supposed principle of obviating congestion in the central nervous structures, infants of the most tender age were bled, purged, and starved for symptoms of impaired muscular function, which are now known to depend on defective nutrition of the muscle itself. Under this depletory system of treatment, for which the still-prevailing theory of an exclusive "nervous influence" is responsible, thousands of young patients have perished, whose only chance for life was that their muscles should be fed, and their vessels replenished.

SPASM FROM DISEASE OF THE EXCRETORY GLANDS.

From disorders of the kidney many effects proceed by the blood through the brain to the muscle; and among them, spasm, epilepsy, and fatal epileptic apoplexy are not unfrequently thus occasioned. Were it not for the correction afforded to our diagnosis by dissection after death, such cases would be registered indiscriminately as instances of cerebral disease. In some, the brain is actually found in a state of partial disorganization or compressed by effusion; in others, and these are the cases in which I have observed the most spasm, there will be entire soundness of cerebral structure; with no congestion, but rather an emptiness of its vessels. Aware of the importance of such cases as these last in forensic medicine, (for they sometimes end suddenly in death,) I drew the attention of the College of Physicians to the subject in a paper which was read at one of their meetings in the session of 1833. Since that time many similar instances have come under my notice.

In the case of a young woman, which terminated fatally in St. George's Hospital, in July, 1834, not less than eleven distinct paroxysms of spasmodic epilepsy were observed in the course of one day, about five weeks before her death. The kidneys, in their cortical structure, were converted into a solid uniform substance of a sizy appearance, with a mottled and somewhat irregular surface. The brain was rather soft and pale, but generally healthy throughout its structure.

In the treatment of such cases, how cautious should be our interference with symptoms! We must not be induced, by the violence and the frequency of the spasm, to bleed largely, as in congestive apoplexy; for blood, we have seen, is wanting in the brain; and, in our administration of internal remedies, we are bound to remember that we are adding new principles to a circulation already overcharged. In diseases interrupting the function of the large excretory glands, the mildest combinations of medicine are occasionally followed by direct and violent effects. Even small doses of the neutral diuretic salts will thus become emetic or purgative, in their operation upon a system prevented in its ordinary business of excretion, and yet determined to rid itself, of what is mischievous if suffered to remain.

The disturbing influence, resulting to the operations of medicine from disorder in the great excretory functions, should be especially remembered by the physician in all prescriptions of the narcotic principle for cases of this description. The effect of opium, in the smallest dose, on adult patients suffering from renal anasarca, especially if this disorder be associated with dyspnœa and bronchial congestion, is often such as to surprise the most experienced practitioner. Its action in such cases may be rapid and intense as when exerted upon infants at the breast. In all these instances, its agency on the system is expressed principally by a suspension of contractile energy in the voluntary muscles. I have for many years past verified this observation in my own practice, and have

never lost the opportunity of urging it on the attention of others. In a late number of a very useful publication, the *Pharmaceutical Journal* for January, 1843, it is stated as a result of the extensive experience of Dr. Christison, of Edinburgh, "that the smallest fatal dose of opium of which he is cognizant, is four and a half grains." There is too much reason to believe that cases of bronchitis, as of renal anasarca, have often been brought to a fatal close by doses of the drug considerably less than one half of the quantity here mentioned.

Spasm of the voluntary muscles is sometimes observed in coincidence with disorder of the kidney. But we must not infer that, in all such cases, the symptoms follow in the muscle from previous disturbance in the gland. Both structures are occasionally disordered in their function by causes that do not originate with either. An esteemed medical friend fell ill during the autumn of 1841, with many symptoms of severe and complicated affection of the kidneys. Lactic acid, uric acid, chyle and sugar were passed continually with the urine, which was excessive in quantity. The skin became harsh and dry, and the sufferer was harassed from time to time by very painful cramps in his arms and legs. Here then was a marked coincidence of muscular with renal disorder; but the case, moreover, presented from the beginning, the most urgent symptoms of disturbance in the functions of the stomach, to which, as to their primary cause, both the renal and muscular symptoms were with reason attributed.

One of the earliest cases in which I was led to observe the coincidence of renal disease with spasm of the voluntary muscles, was that of Edward Whittal, admitted under my care into St. George's Hospital, on December 2, 1829. He was generally anasarcous, of a dull white complexion, and suffered much from cough with dyspnœa. Ten days before his death, which happened on December 19th, he was attacked by epilepsy with strong convulsions. The brain, on examination, was found to be pale and bloodless; the kidneys in their cortical structure were converted into a smooth white homogeneous mass; the right lung was emphysematous, the left gorged with blood and serum.

In another fatal case of renal disease, selected from many others of similar character, that fell under my care in November, 1833, severe and frequent spasm of the throat and limbs was associated with dyspnœa, vomiting, and coma. The brain, as in the man Whittal, was pale and bloodless, with large gaping mouths of vessels on its cut surface. Much limpid serum was effused between the arachnoid and pia mater. The kidneys were exceedingly small from the almost total disappearance by disease of their cortical substance. Some days before the death of this man, while he lay bathed in perspiration, small quantities of a white saline powder were observed continually presenting themselves in points on his face, and generally over his body*. The urine, which had previously been suppressed, was at this time profuse.

* This material, was ascertained, on analysis by Dr. Prout, to consist principally of lithate of soda.

SPASM INCIDENTAL TO CHILD-BEARING, AND THE MENSTRUAL FUNCTION.

Spasm, it is well known, is a frequent incident of the puerperal function, by which is necessarily implied a new state with increased activity of the general business of nutrition. Women, while suckling, or even after weaning the infant from their breast, if lactation has been unduly prolonged, are liable to attacks of spasm, severe and protracted, in the voluntary muscles. In two cases of this kind which came under my notice within a short interval of time in the spring of 1839, severe cramp of the limbs was coincident with symptoms of mania. In a woman, aged 45, admitted into St. George's Hospital a few months previous, there was loss of power in both arms, with much pain in the course of the lower flexor muscles, which contracted spasmodically and with violence, on the least pressure of the corresponding surface of their integuments. Lactation in this case had been prolonged for nine months; and I attributed much of the severity of the local symptoms to the strain endured by the muscles of the fore-arm in holding the baby to the breast. Light tonics, gentle purgatives, opium nicely administered, with a sufficiency of good food, and rest, after weaning the child, generally induce recovery in these cases.

In further illustration of disorder induced in the voluntary muscles by influences proceeding from the

generative system, I am enabled, by the kindness of Dr. Nairne, to state the following particulars of a case of chorea, which terminated fatally in St. George's Hospital, at the close of the year 1842.

Amelia Lidgett, aged seventeen, was admitted under the care of Dr. Nairne on November 16th, with urgent symptoms of spasmodic muscular disease. She had first menstruated a year and a half before, and twice afterwards, at regular periods. The catamenia did not again appear until August, 1842, when she menstruated for the last time. On all these occasions she suffered great pain in the lower part of the abdomen. A week previously to her admission into the Hospital, she was brought home from service, unable to stand, and complaining much of pain in her arms and legs. Shortly afterwards, her hands became unsteady, but it was only two days previously to her admission into the hospital, that she was attacked by general convulsive moments. At this time, the body and limbs were continually thrown into violent involuntary action. Her features were distorted by unceasing spasm; she had great difficulty in protruding her tongue, and was unable to articulate. The pulse was very rapid, and there was much thirst. She was ordered into the warm bath, to be moderately purged, and to take calomel twice in the day. On the morning of the 18th, the violent movements of the body had ceased, and the muscles of her face were only occasionally convulsed. The spasm was, however, immediately renewed in the arm and entire body by slight pressure of the wrist on feeling the

pulse. She was very drowsy, but readily put out her tongue when requested to do so. The pulse was extremely rapid and very feeble. The warm bath had been employed a second time, and a large quantity of fæces had been brought away by injections. She lay in a much quieter state during the afternoon, fell into a state of stupor towards evening, and died at one o'clock, A.M., of November 19th. The body was examined sixty hours after death.

There was great congestion of the vessels of the brain, with slight effusion at its base. The cineritious substance was much darker than usual. The bloody puncta in the medullary structure were very numerous. There was also slight congestion of the substance of the spinal chord. The right side of the heart was gorged with blood, and there was slight hypertrophy of the left ventricle. The structure of the lungs was healthy.

The small intestines, from the jejunum down to the ilio-cæcal valve, were found to be filled with fæcal matter of a lightish colour, which, from its adhesive nature, was with difficulty removed from the inner surface of the bowel. There was no abrasion or congestion of the mucous membrane of the small intestines. The large intestines were also filled with fæcal matter of a less tenacious consistence. The mucous membrane of the cæcum and ascending colon was of a dark purple colour; but its surface was everywhere continuous.

The peritoneum lining the whole of the pelvic cavity was highly congested. The uterus and ovaria

of this young female were much larger than they usually are in women who have borne children. The uterus was very much congested throughout; its cavity was larger than natural, and the mucous membrane lining it was of a dark purple colour. The os uteri was healthy. The mucous membrane of the vagina was highly congested, and covered with a thick whitish discharge. Both ovaria contained several small cysts, in which was a transparent fluid. The right ovarium presented one of these small cysts, into which an effusion of blood had taken place.

In a communication addressed to Dr. Nairne respecting the appearances presented by the ovaries in this case, Dr. Robert Lee observes, that "the most remarkable circumstance about them, is their immense development and the number of the Graafian vesicles they contained. The left ovarium is two inches and two lines in length, and much thicker than the ovarium usually is; this arises from a remarkable development of the parenchyma of the ovary, in which there are a number of Graafian vesicles imbedded at different depths, and of different sizes. One near the centre would contain a large pea, and its coats are of a black colour; the peritoneal coat of this ovary is so smooth, that I can discover no appearance of a cicatrix in it. The right ovarium is the same in size as the left, the parenchyma remarkably thick, and several similar Graafian vesicles are seen in different parts of it. On the surface there are two or three distinct cicatrices; one of them presents the appearance of the peritoneum being drawn into the

substance of the ovary. The ovaria were cut open before I saw them, and the blood had escaped. The neck and orifice of the uterus were filled with a quantity of the viscid matter secreted by the Nabothian glands."

It is not within our present purpose to add one more dissertation to the many already extant, on puerperal convulsions. In ordinary practice, this great muscular disorder is referred exclusively to a supposed condition of fulness and inordinate action in the vessels of the brain. Like the other varieties of spasm, the convulsions incidental to pregnancy should be considered, in reference to individual habits, and in connection with all circumstances operating, from within as from without, for change in the constitution. There is every reason to believe, that the effects of disturbance coincident with the parturient functions of the uterus in the double voluntary muscles, are the result of material changes in the general mass of the blood, rather than of mere local irritation of the nerves, or of any direct alteration in the volume or moving impulse of the veins and arteries. Venesection is too largely practised in the ordinary treatment of puerperal convulsions. In most of these cases bleedings are necessary; but in few, are they all-sufficient.

GENERAL TREATMENT OF SPASM.

Of all that comes under treatment in disease, that which is least respected and let alone, is spasm of the voluntary muscles. Exception is made to it wherever it is found; and often, with no reference to the collateral symptoms of the case. Physicians, worthy of the name, who, truly bold in their practice, will dare, at times, to encourage inflammation, and to leave hæmorrhage unchecked, are yet unable to withstand the temptation of prescribing for irregular action of the voluntary muscles. If it were possible by medicine, suddenly and entirely to put down spasm in the voluntary muscles, it would still remain a question with reflecting practitioners, whether it would be right, in any case, so to interfere. It is difficult, no doubt, to establish a purpose in spasm; to understand what gain to the sufferer can be effected by involuntary and painful contractions of muscles usually under the dominion of his will; but, from all analogy, we are still led to believe, that there is in spasm, as in other disordered actions of the living body, a curative principle, with a benevolent tendency; implying patience and forbearance in the management of the case. It has been remarked by Dr. Christison, that, in some cases of recovery from tetanus, the improvement of the patient was coincident with the return of the spasm in the voluntary muscles.

Undoubtedly, when the spasm extends over a great range of muscular structure, considerable effects must

follow in the general circulation, from the pressure thus induced on the vessels of the contracted muscles. In the delay of the blood's current thus effected, there may, without insisting unduly upon the suggestion, be a measure of relief to the circulation through the inner vital organs of the body labouring, with the muscles, under the general disturbance of the system. In the epileptic paroxysm, it is better not to struggle with the patient; and even were he able to swallow, antispasmodic medicines should not be prescribed. As he is circumstanced, this strong action of his muscles is for his good; influencing directly the mechanism of the circulation, and inducing further chemical changes, by waste of oxygen, in the blood.

Some sensible remarks were addressed to one of the journals, in September last, by Mr. French, of the St. James's Infirmary, advocating this principle of respect for the symptom of cramp in the treatment of the cholera, then epidemic in the metropolis.

To the detail of the practice commonly followed in spasmodic diseases, there is this great and serious objection. The medicines in use are, for the most part, selected on the false analogy, which, in modern physic, is assumed to exist between diseases of the muscular and those of the nervous structure. In the recent edition of the Paris Manual of Pharmacy* for 1842, "antispasmodic" medicines are universally assumed as "nervous" in their first effect; and the nux vomica, with its salts of strychnine, is admitted

* *Nouveau Formulaire Pratique des Hôpitaux*, par MM. Milne Edwards et P. Vevasseur.

into the limited class of "Special Excitants of the Nerves," from its known influence, by spasm, on the muscle. Its only associates under this designation are brucine, arnica, wine, alcohol, and phosphorus.

Here is one result, among many that are to be deprecated, of the anatomical principle which has of late years prevailed in the classification of disease. Remedies have been administered, as diseases have been named; in exclusive reference to particular structures, or to certain organized divisions of such structures, no account being made of the ever-varying states of the material which is common to all structure. In disorders of the muscle, it was found, from the numerous divisions of the fleshy organs, and from their supposed uniformity of function, that such isolated arrangement of their diseases was impossible. For the muscles, therefore, in control of their disordered as of their healthy action, a "system" so-called "nervous," has been gratuitously supposed by physiologists, to which every muscle is made equally amenable. Here, resting on a good and necessary principle, the construction is faulty and incoherent throughout. The expression "nervous system" is true only in its anatomical sense. There is no common function of the nerves. No common influences are transmitted through the nerves to general structure, excepting such as have been received by the central nervous structures from the blood; and these influences, they, the nerves, communicate to their several structures, each after its kind; for the nerves vary in their function, as in their anatomical cha-

racter, with the great organized divisions of structure from which they originate. By the processes of nervous matter issuing from their fleshy structure, particular muscles of the voluntary class are placed in immediate relation, for the proper discharge of their function, with certain portions of the brain or spinal column, and with such portions only.

In disorders of the muscular function, let us not, therefore, seek to control the symptoms by means addressed specially to the fleshy structures through the "nervous system," as implying an influence common to all the muscles from all the nerves. We speak familiarly, in disease as in physiology, of a simple central nervous authority, universal and instantaneous through all structure. There is, in truth, no such thing. Over the voluntary muscles, in the discharge of their separate functions, no direct influence is exercised by any portion of the double brain or spinal marrow, excepting by the portion to which, in continuity with their nervous structure, the muscles severally belong. Our remedies reach the suffering organ in all cases through the blood; and if through its nerves, still through the common blood; for the nerve of every muscle, where organized in the brain, is equally sentient of influences from the blood as where it is associated in triple union by structure with the blood and the fleshy fibre.

By admitting, in the treatment of spasmodic disorder, this wide principle of the primary agency of the blood, we are induced to vary our means of relief greatly beyond what we should suppose feasible, were

the symptoms always attributed to the exclusive agency of a distant nervous influence, or to the mechanical effects of a local nervous pressure. Thus, the painful muscular contractions incidental to the various stages of pregnancy, may often be removed by means directed to the improvement of the general health through the circulation; with no reference to the position of the uterus, or of the nervous trunks in its neighbourhood. Moreover, in admitting the paramount importance of the blood, by symptom and remedy, in all disorders of the muscular function, we are careful not to waste its stores, under circumstances that imply a contingent necessity for muscular exertion. Were the abdominal muscles more considered in the early stages of pregnancy, fewer women would die in childbed. The fashion prevalent among British accoucheurs, five and twenty years ago, of bleeding, purging, and otherwise lowering the healthy young women under their charge, has probably altered the succession of our line of kings. There are well-authenticated grounds for this conjecture in the medical records of 1817.

TREATMENT OF SPASM WHEN COMPLICATED WITH GLANDULAR DISEASE.

On the soundness or unsoundness of the large common excretory glands, the effect on the system, of such medicines as those usually prescribed for the relief of spasm, must in great measure depend; in the one case, they are separated in due time, entirely or in part, from the current of the healthy blood; in the other, they remain, as elements of mischief, in circulation through the already disordered structures. If the large excretory glands refuse to separate from the blood what ought to be removed from its current, its entire mass becomes, at last, charged with principles which render it unfit for the preservation of the general health. Hence arise symptoms of disturbed action in the several organized structures of the body, especially in those, in which, as in the heart, lungs, and brain, the blood is most abundantly employed. Every physician, with large opportunities for observing the treatment of disease, may find repeated illustrations of this great practical truth in the perplexing variety of effects that follow the administration of the same medicine in cases apparently the same. How often, in the published narrative of selected cases, are we required to share in the surprise expressed, with unconscious simplicity, by the author, at the untoward appearance of a pleurisy, an apoplexy, or an inflamation of the bowels, of which, although apparently

unconnected with the previous symptoms, we find a ready explanation in the annexed list of prescriptions. Failing to arrest the actions of disease, medicine, too frequently, disturbs the succession on which their safe development depends. If unduly retained in the system, by interruption of the proper excretory functions, it becomes, in truth, a poison; of which the effects are determined in the lungs, or in the brain, to the serous or to the mucous membranes, by inflammation of their structure or by fever general throughout the system, according to the habits and temperament of the patient, or other circumstances peculiar to the case.

SPASMODIC CHOLERA, AND ITS TREATMENT.

The most frequent form in which spasm comes under our notice in this country, is that in which it is associated with vomiting and diarrhœa, making part of our epidemic bowel complaint. Thus localized by a name in a particular structure, this great constitutional disorder has not been sufficiently considered in relation with the other divisions of the animal frame. Its symptoms, which, in their true and natural course, are derived from and through the inner system, have, under a false theory of "nervous irritation," been made to proceed from the bowel to the parts within. Thus, the cramps incidental to this complaint, have been explained; not by direct agency of the blood upon the fibre, but by a supposed circuitous passage of "nervous impression" from the mucous surface of the bowel, through the spinal marrow, to the nerves of the affected muscles. It was not until reflection was forced upon us by the terrible analogies of the Indian cholera, that we began to discover the true relative position of symptoms in our own epidemic bowel complaint.

The cholera has done great good to physic. When it came, it found us almost exclusively busied with partial changes of structure, and prescribing only for symptoms. Of the inadequacy of this method for the practical study of disease, every reflecting physician

was already convinced. Wider principles were required, and the cholera helped us to them, where only they could be found. It compelled our attention to the muscles; and through the muscles, to the blood. The symptoms of this great constitutional disorder, impossible in their rapid and fatal succession as effects of mere "nervous irritation," are at once explained on the admission of causes, by which a spoiling and wasting of the common material of the body are implied.

In the early days of our invasion by spasmodic cholera, when even learned colleges of the Isle were frighted from their propriety, there was much undue exaggeration of the disturbance effected by this disorder in the function of the voluntary muscles; but the miserable results of the purely antispasmodic practice served still further to convince all true observers, of the wide pervading nature of the influences by which the spasm was determined. Epidemic cholera, in all its varieties, is the result of an atmospheric poison, or other vice, in the blood. It is not only by cramp, that the voluntary muscles are affected in cholera; a sensation of soreness and stiffness in these structures, impressed as if by a cudgel, is frequently noted among the earliest symptoms of the disorder. All the double voluntary muscles are liable to such disturbance of their function; and in the recollection of this law, we shall be occasionally helped to a better understanding of certain deep-seated pains and sensations of weariness or uneasiness referred to the inner pelvic and lumbar regions of the body during the prevalence of the epidemic influence.

In the treatment of cholera, British or Indian, no special regard should be given to the spasm of the voluntary muscles. There is a strong temptation to prescribe opium in such cases, which, for the most part, should be resisted. When, in the combination of cramp with diarrhœa, the power of the drug in arresting symptoms is greatest, its use is least authorized. If the excretion, which seems essentially necessary, in this disorder, for the relief of the patient, be at once checked, the early symptoms of the case are not unfrequently exchanged for general fever, or for inflammatory action in organs of more immediate and vital importance than the voluntary muscles or the mucous membrane of the bowels. With improved experience in the use of medicine, we may hope to arrest the diarrhœa, and to subdue the spasm in this disorder, by counteracting within the system the disturbing agency on which both depend. At present, we are bound to suffer, if not to encourage, the diarrhœa, that, through it, the spasms may cease. There is reason to believe, that the neutral non-aperient salts do occasionally act on the principle now suggested; as antidotes, that is, to the cholera poison, while yet circulating in the blood. When opium is found useful in certain stages of this disorder, its effect of relief is neither directly astringent to the bowel, or antispasmodic to the muscle; but follows, simultaneously, to all structures, from what is universal in the system. As of the food and the air in their agency on living matter, so should we believe of this, the paragon of drugs. The effects of opium on the contractile func-

tion are more immediate and remarkable in the structures whose action is constant and involuntary, than in the muscles which are under a direct influence from the will. Spasmodic diarrhœa, or urethral stricture, will often yield to a dose of opium which would prove utterly inefficient for the relief of cramp in the voluntary muscles.

Opium, when in active circulation through the body, influences all nutrition, and modifies every secretion. Its effects on particular functions are so marked and various, that, observing them separately, we fail to consider them in their combination. Opium is alterative in the widest sense of the term, and should never be prescribed for the use of a part, but in remembrance of its power over the whole. The more frequent application in medicine of the rule thus inferred from opium, would correct much that is now bringing reproach on its practice. There is a lamentable satire on physic in the habit prevailing among us, of overlooking, for the time, all contingent effects of the remedies employed, in our one contemplated purpose of the case as we wish it to be. Thus with mercury, as with opium. When the mineral is administered on the direct indication of counteracting a poison already in the system, the special agencies attributed to it in relation with the functions of the liver are for the time conveniently forgotten. As occasion serves, it prevents inflammation of serous membranes in the head, chest, and belly; or is the one stimulant relied on to increase the rate of the pulse, and to "rouse the dormant powers" of the

system. It is antiphlogistic, antispasmodic, antibilious; that, and that only, as may appear best suited to the crude fancies of the ever-theorizing "practical man," in his rude interference with the symptoms of the case. Between this and quackery there is no real difference. Thus, for many years past, by a system of mock energy in the treatment of disease, reckless in its means because opposed to reflection, and pretending to facts from the absence of principles, the study of physic has been discouraged in this country, and its practice degraded. We have long and loudly denied reason in our proceedings, and the public have taken us at our word. We profess empiricism, and they believe us. Hence, in great measure, the uneasiness which is now felt throughout the profession, in all its social relations.

There must be rational medicine in England, before there can be medical reform.

That such reform may be wholesome and complete, the modern British practitioner should be made to remember that he has been the principal agent of the degradation under which he now complains. Under the opprobrious term of "Theory," he has condemned the exercise of his own reasoning powers; and thus is compelled, in ruling much of his practice, to an exclusive reliance on false facts and blundering experiments. In refusing the sentiment, and denying the philosophy of his profession, he has levelled its best defences against the rapacity of pretenders, and the meddling ignorance of the vulgar.

Everything in physic is now taken on assertion;

and in physic, as at Court, assertion has ever been found "as easy as lying." Men of patient and disciplined minds retire from a study, in which, though it charms them by its difficulty, dulness is suffered to dogmatize, and every brawler constitutes himself an authority. The result in the character of the profession is that of cleverness without sagacity. It loses dignity, and wants repose. It is the bar of the Old Bailey, with no Judge on the bench.

For the better security of our social interests by the improvement of our professional studies, there is no help but in ourselves. Of physic as a science, and in its usefulness, the public take no heed. Their sympathy is only with its follies. In truth, the ignorance of the gentry of England in medicine, gross as their credulity, is the superstition of barbarism.

This is especially true of the aristocratical sections of society. In their vain struggle for consequence, they find in physic an occasion for patronage, and use it as a thing of fashion. Incessantly occupied in the consideration of their own health, or in speculations on that of the few whom they acknowledge as their neighbours, they pretend to the possession of the truths of medicine from the habitual prostitution of its phrases. Persons of the highest talent and most refined education, shrewd, sensible, and opinionated in the general business of life, are content, in all questions relating to their health, at once to surrender their judgment, and to converse in a jargon. Their intercourse with professional men is one of words without thought, and of folly with no amusement.

By a large portion of the public, the foreign impertinences of homœopathy, and the murderous follies of the British allopathist, are received in turn with equal favour. Counter-irritation is exchanged for mesmerism; and to mesmerism succeeds hydropathy. Their vaunt is of calomel in scruple doses, or they denounce it in the infinitesimal globule. The highest merit ever recognised by valetudinarians of fashion in the physician of their choice, is that of a certain practical cleverness, expressed in handicraft, and by the vulgar, as a "knack." And of these persons, some are legislators, chosen or hereditary, for the protection of the public health, as for the preservation of its morals! Of their fitness for the first of these duties, there is abundant evidence on the record of our criminal courts. Lords and baronets, there aspiring to the honours of physic, lose of authority what they held before, and graduate, on examination, as convicted simpletons.

The wise and modest physician, while enjoying the favour of these sectarian dispensers of medical reputation, will never fail to remember that he holds it only by right of caprice, and in a chance succession with those whose professional fraternity he would be least willing to acknowledge.

And bitter is the penalty in which society suffers for the indulgence of its humour, that physic shall be fashion. In the wild revel held by empirical medicine in England, during the last quarter of a century, thousands have perished madly on example, whom a moment's free and sober thought would have helped

to live. Under these prevailing influences, physic suffers a social degradation, and with it, collectively, its professors. To ourselves, still from the same cause, a further prejudice ensues; affecting us in all our relations of business and mutual intercourse. Wanting a true catholic faith in the creed we profess, we are, as physicians, without moral union, and can do nothing in common.

Respecting medicine more, we should more respect each other, and things which are now suffered to our shame, would then be impossible.

Colleges instituted for the protection of the public health would not condescend from such high interests to the trivialities of sectional politics; in the criticism essential to medical literature, the scholar's fear would cease to be the gentleman's reproach; and charity would no longer be scandalized by the treacherous cabals and merciless persecutions so frequent in our hospital communities. It is only by combined intellectual exertion that, as a body, we can hope with the public to improve our social position. To this end, as yet, there has been but one step in advance. Excepting in Pharmacy, medicine's safe jest is still her corporate reform.

TETANUS.

In the practical study of Tetanus, we are, from the first, awed by the evidence which it presents, of antagonist principles in simultaneous operation on the same living structure. The great character of this disorder is one of active defiance to the will in organs synonymous with the habitual exercise of its power. The contractions of the muscular fibre are never stronger than in the tetanic spasm, when, by volition, they are most opposed. In seeking for the principle of this countervailing agency in the muscle, we are led by our former inquiries, at once to the blood. The blood, it is known, is independent of the will. It has the power of arranging its own particles in its own way,—it contracts and expands by a function inherent and peculiar to itself. It stirs instantaneously and simultaneously throughout its entire mass, thus swaying by direct movement the muscle which in bulk it forms. By the operation of certain external forms of matter on the blood, tetanus can immediately, and at any time, be induced. Again, it follows, as an occasional effect of disturbance in the general business of temperature and nutrition, of which the blood is the chief agent and sole material, and with which the will has no concern.

By thus considering tetanus in its wide and constant relations with the blood, we cannot fail to know it in its true character of a great constitutional disorder. Because it begins and ends with spasm of

the voluntary muscles, Tetanus has hitherto been classed with affections of the "nervous system;" an undue limitation of the disease, for which there is no sufficient warrant by the symptoms, or in its general pathology. Like fever, it pervades the entire system, and is special in the flesh, being common in the blood. A fever in truth it is, spasmodic and remittent in its character. As a fever it proceeds from local injury, or constitutional disturbance, requiring for its full development a certain period of previous incubation. Like fever, it is endemic, and epidemic, prevailing in certain places, and at certain seasons. In military hospitals, where its visits are most frequent, they are very irregular in their recurrence. After some of the later battles in the great Peninsular war, the mortality from tetanus, among our troops, was much greater than it had been on similar occasions in earlier periods of the campaign. More recently, certain regiments of the Anglo-Spanish Legion under General Evans, suffered severely from the disease in the wet and cold weather that succeeded the manœuvres in the early spring of 1837. On the other hand, very few cases were observed in the French military hospitals subsequently to the tremendous conflict of Borodino in the autumn of 1812.

Some very valuable statistical information on the comparative frequency of tetanus after military accidents and operations, has been recently published by Mr. Rutherford Alcock, one of the surgeons in chief attached to the service of Don Pedro, in his Portuguese campaign.

In Buenos Ayres, of which the name implies the healthiness of its locality, and generally along the course of the Plate River, tetanus, both traumatic and idiopathic, is a common disorder. As the Mal di siete dias, or Trismus nascentium, it is very fatal to the infant population of this district of the South American continent. The liability of individuals to attacks of this disorder ranges with a great variety of circumstances which relate to the general health and condition of the body; but there is no definite law, under which, a sufficient cause existing, tetanic symptoms may be expected necessarily to follow. A naval officer, rather advanced in life, but in good general health, received a blow by which the ossa nasi were displaced, and in part crushed. Tetanus of the most severe kind followed the injury; the opisthotonos was complete, and the tongue was frequently thrust forward and bitten by the spasm of the maxillary muscles. He recovered after a protracted illness of nearly three weeks, under the care of Mr. Rouse, of Walham Green, who gave to the case his closest attention, and who believes that the cure was effected principally by the administration, in repeated doses, of the croton oil.

Nearly at the same time, a gentleman, about sixty years of age, of impaired constitution, and habits by no means regular or healthy, fell under the care of Mr. Rouse, for a ragged lacerated wound of the wrist, received from the bite of a wolf in the menagerie of the Zoological Gardens; but on this very likely injury, no tetanic or other bad symptoms supervened.

Another case occurred, in the practice of the same intelligent surgeon, sufficiently illustrative of the uncertain character of the actions that induce and constitute the tetanic disease. A healthy lad fell from a ladder, and struck his knee in the fall. The skin was bruised but otherwise uninjured, and there was no evidence of fracture in or about the joint, of which the motion was very little impaired. The boy seemed in every respect to be doing well, when tetanus supervened, and he died.

Some years back, the late Mr. Walker, of St. George's Hospital, saw this disease terminate fatally in a young lady, who had punctured her foot by treading on a needle, which was removed unbroken from the wound. There was no suppuration in this case, and the general health of the patient was considered good at the time of the accident.

Not long since, a young British nobleman was wrecked, late on a winter's evening, in proceeding up the Nile to Assouan, his boat having fouled and capsized. In escaping through the cabin window, he received a deep penetrating wound of one finger, while the fleshy top of his thumb was severed by the broken glass. Drenched to the skin, he was afterwards exposed, for many hours, without shelter, on the wreck; and yet, in the sequel, the wound healed readily, and no tetanic symptoms supervened*. The

* Mr. Tardrew has informed me since his return, that the wounds were for some time very painful, and that on the third night from the accident, his patient was suddenly awakened by a sense of exceeding illness, with a cold, clammy state of

case was one that, for some weeks, necessarily occasioned feelings of the most anxious suspense to my young friend Mr. Tardrew, the intelligent surgeon and fellow-traveller of the party. Of the circumstances generally considered most favourable to the production of tetanus, in this Egyptian adventure, none were wanting. The patient behaved throughout with the spirit and cheerfulness which distinguish his manly nature; yet neither he, or those about him, could fail to remember, that only a few years before, his cousin, while within reach of every help and comfort, had died of tetanic spasm, in less than ten days after the clean cut, by a woodman's axe, of his toes. To this sad case allusion has already been made. It happened to a friend.

As in its accession, so in its duration, tetanus is analogous to fever. It is a long illness, with acute symptoms, requiring a term of some weeks for its completion by recovery. Like fever of the worst kind, it is in most cases rapidly fatal; but it is yet too early to pronounce on the comparative mortality of a disease, which, by the urgent character of its symptoms, provokes extreme measures of treatment, and is known, only in combination with the effects of such medicines as opium, strychnine, belladonna, or tobacco. It may be a question, whether to any civil practitioner in this island, the opportunity has ever occurred of

the skin, and great constriction of the chest. These alarming symptoms yielded, however, to a second dose of ammonia, Hoffman's æther, and laudanum.

observing a case of tetanus throughout, in which opium did not form some part of the treatment.

As in other recognised fevers, the disturbing influence of the disorder is determined specially to the lungs, the skin, the joints, the mucous or the serous membranes of the body, so, of tetanus most is felt and expressed by the great double masses of the fleshy structure. In familiar phrase, tetanus may be termed the muscle-fever of pathology. In pursuing this analogy through any given number of cases, we find its illustration, not only in the spasm, but in many collateral symptoms of disturbed action incidental to the disorder. The great development of animal heat occasionally observed in tetanus,—the acceleration of the pulse,—the acid perspiration,—the alkaline urine, and the obstinate constipation,—are so many evidences of a prejudice, general, like that of fever, in the system. There is only one way in which the tetanic spasm can be induced at will; and this is by the agency which alone is universal in the body. It follows, at once, from the introduction of certain poisons to the blood. Strychnia, thus applied, is succeeded by locked-jaw and opisthotonos, as surely as small-pox follows inoculation. Here then, by direct and infallible evidence, the blood is established as the first recipient and principal agent of the material influence, under which the predominant symptoms of tetanus are induced. The cause determining this spasm is in constant operation, and is directly applied to every fibre of every muscle. It is a cause sufficient for the production of the symptoms in their utmost

intensity, and is one which escapes all notice of the will. For the rational explanation of the effects induced by tetanic disease, we need no other principle than is here afforded. And yet, of the blood in tetanus, how little account has hitherto been made!

By practical writers it is scarcely ever considered in their description of what constitutes the disease, or as suggesting improved methods of treatment. In the majority of reports, otherwise full and exact, of the appearances observed in fatal cases of tetanus by dissection after death,—the quantity, the consistence, the colour, and distribution of the blood, than which nothing in the body is more sensibly altered under the influence of this disease, are dismissed without, or scarcely with a remark. The disease is known principally as one manifest in the flesh; and should, if only on this first showing, be studied in constant reference to the composition and functions of the blood. In disregard of principles thus easily supplied, and of a theory simple and sufficient for the arrangement of all facts connected with the disease, pathologists have of late years substituted a vague phrase of "nervous irritation" in supposed elucidation of actions co-extensive with the entire muscular structure. It is from the traumatic variety of tetanus, that the exclusive agency of the nerves has been assumed, in explanation of the phenomena presented by this disease; but there are no good reasons for believing, that the spasm, and other symptoms occasionally observed to follow on slight local injury, are induced by mere effects of "irritation," from the nerves

of the injured part. Spasm of the voluntary muscles, single or in sets, may, it is well known, be made to follow from mechanical or chemical irritation of the trunk, or large branches of their corresponding nerves; but the spasm thus provoked is partial and temporary, not frequent and successive as that of tetanus; it is confined to certain divisions of the fleshy structure, and lasts only while the irritating cause is supplied. It cannot be induced by a distinct irritation of the minute filaments of nerves, organized remotely from the muscle; and is never known to extend to the entire muscular structure on both sides of the body. It is, moreover, in all cases, an immediate effect of the local injury, not suffering, as in the tetanic fever, the delay of days or weeks previously to its development.

By no irritation, by no torture, however ingeniously devised, of any nerve or of any number of nerves in the body, would it be possible to establish a complete tetanus in the muscular structure, under a given period of time, varying from forty-eight hours to three weeks. Thus, in a fatal case of the disease, already used in reference, the toes were accidentally wounded by a wood hatchet on February 4th; six days later, the tetanic symptoms supervened, and on February 11th the patient died.

Lord Sydenham died of locked jaw on September 19th, 1841, having broken his leg above the ancle on the 7th of the same month. He had been free from spasm for some days after the injury.

We have seen, on the other hand, that in a few

seconds, a tetanic spasm, universal and fatal, of the entire range of the voluntary muscles, may be induced by the introduction of a few drops of poison to the blood.

No mere irritation of the nerve would suffice for the production of tetanus; and, in most cases of this disease, there is no evidence during life, or by dissection after death, of the existence of any local irritation in the nervous structures. They are irritated, no doubt, at the moment of the injury, by the bruise, or the puncture; but the spasm which follows, if any, is not then universal or tetanic.

Spasm is much more readily and extensively induced by a prejudice of the blood, than by an injury of the nerves; but to constitute a case of tetanus more than spasm is required. Spasm, frequent and protracted, of the voluntary muscles, is in itself a severe disease, implying disturbance, or interruption of functions the most important in the body,—yet such spasm alone would not be fatal. The spasms of tetanus are not more violent than those of epilepsy, which in their effect are salutary to the patient.

There is in the tetanic fever a further state of the voluntary muscles, more remarkable than spasm, which no present theory of the disorder suffices to explain; a something, which, while it cramps the fibre, kills it and all besides. In the fixed unrelaxing rigidity which it enforces in particular muscles, tetanus assumes a character independent of all nervous agencies hitherto acknowledged, and seems to associate

itself with the stillness and stiffness of death. It is scarcely possible to refuse the inference, that, in such cases, the state of the muscular fibre is mainly determined by what influences the coagulable properties and local settling of the blood.

Assuredly, there is a close relation of living property between the blood and fibre, in the tetanic paroxysm, as in the other operations of disease. And this is expressed, not, as from a loose analogy we might suppose, by more ready coagulation and greater firmness of the blood-clot, but by a tendency, in most cases, to the opposite state of liquefaction. Of blood drawn for the relief of tetanic symptoms, the crassamentum is often loose, while the muscles are rigid; and what remains in the heart after death is almost invariably fluid. This is the converse of what happens in fainting; thus, while the blood jellies and becomes firm, the muscle is relaxed.

Strange that this parallel function of fibre and fibrin should be so much overlooked in a disease, which, can at any time, be made to begin in one of those organised bodies, and is always necessarily developed in the other. The observations hitherto attaching to the blood, in the pathology of tetanus, are almost exclusively confined to its appearance and behaviour in limited quantities, as obtained by venesection during the life of the patient. Cullen, and after him the professors of half a century, satisfied themselves and their school questioners with the one remark, that the blood drawn in this disease was generally thin and wanting in consistence.

I have mentioned a case under my own observation, in which, on the third day of the spasm, it was well set and buffy. Eighteen years back, I remember seeing a stout young man on his death-bed with traumatic tetanus, in the Middlesex Hospital, whose blood exhibited the buffy crust. Mr. Herbert Mayo introduced me to this case, the first that, after many years' experience of disease, I had ever witnessed.

It sometimes happens in this disease, that death follows instantly on a convulsive paroxysm, by which the chest is fixed, and the breathing interrupted, so that the patient expires, apparently strangled by his own muscles. Thus, in a fatal case which has been previously mentioned, the patient, an athletic man of middle age, having slept for two hours on the third day from the invasion of the symptoms, suddenly awoke, and in a spasmodic effort for breath, at once ceased to breathe. But in all such cases, it must not be inferred that the spasm is the sole and immediate cause of death. This would be to suppose a principle of action, vigorous, and prolonged, in the muscular structure, after the extinction of life in other parts of the body.

Spasm is an act of life, and thus, while interrupting the discharge of a vital function, is necessarily engaged in limiting its own duration. Under the ordinary circumstances of health, spasm of the chest is in this way determined. It ceases by its own effect. Thus, the epileptic paroxysm in its most aggravated and sustained form, does not last beyond,

or exceeds only by a few seconds, the time during which the practised diver holds his breath under water; the effort ceasing in both cases from the presence of unventilated blood in the muscles, by which the chest is forcibly closed. The final spasm of tetanus, as in death by hanging, is but one effect the more on the muscle from a cause in general operation through the system. It is the last act of life, but is not therefore the immediate cause of death. Yet, this it may in truth become, if there be previous obstruction of the passage of the air through the lungs by effects of organic alteration of structure, or if the blood by previous disease, as in the worst cases of tetanus, shall have been brought into a dying state, incapable of resisting, even for a few seconds, any new influences exerted to its prejudice.

In traumatic tetanus, all direct evidence is against the admission of local "irritation of the nerve," in the wounded structure, as the cause of the disease. In many cases on record, the wound on which tetanus has supervened, has been entirely healed before the spasms have commenced; in others, the healing process has been completed during the progress of the tetanic spasm to its fatal close.

In a traumatic case of recent occurrence in a provincial district, the death of the patient by locked-jaw, nine days after the healing of the wound, was considered by the neighbours so completely unaccountable, that a cry of "neglect" and "bad surgery" was set up, for their better satisfaction, against the

practitioner in attendance. The unfortunate sufferer was a young farm-labourer, who had been gored under the shoulder by a hay-fork. From all effects of the wound he had apparently recovered, and had been at work during a full week before the appearance of the first tetanic symptoms.

Dr. Elliotson has mentioned an instance, in which, as the wound became worse, the tetanic symptoms abated, and the patient finally recovered. In converse of this case there is one on record in the *Lancet* journal, of October 29th, 1839, which ended well in twenty days from the invasion of the spasm. It was treated by Mr. Arthur Adye, of Bedford, and is a very interesting contribution to the history of tetanus.

The patient, a boy of fourteen, had his left arm bruised and lacerated by the cog of a wheel, on July 12, 1839. The wound remained with an unhealthy doughy appearance till July 21st, when violent spasms supervened in the injured arm. The throat and neck became at the same time stiff and uneasy, having been carefully wrapped by the nurse in the belief of a sudden affection from "cold." The jaw was subsequently closed. Immediately on the commencement of the trismus, the wound became healthy and progressively healed. On August 2nd, the muscles had become less rigid, and eight days afterwards the recovery of the patient was complete. There had been profuse perspiration in this case. It had been treated by calomel, in combination with musk and Dover's powder, repeated, at frequent intervals, until ptyalism was induced; but it did not appear to Mr.

Adye, that the symptoms were modified by any of the remedial means. The warm-bath had been used, with a free allowance of broth and wine.

The connexion of tetanus with local injury has reference only to structures of a particular class. Its symptoms, in their traumatic variety, are never induced but from the lesion, by external violence, of parts not essentially important in the animal economy. In no case do they follow, as a consequence of the structural changes, however irritating and destructive, which mark the progress of internal disease.

From organic injury of the heart, lungs, or liver, (of structures, be it remarked, which never sleep,) tetanus was never known to begin. Thus, we find the local origin of a disorder generally fatal in its effect on the system, not, as we might expect, where the great functions of life are in constant, untiring operation; but, in parts of the body not of vital necessity, and whose use is mechanical, occasional, and subordinate.

In the further development of the tetanic principle, there is the same apparent exəmption of the vital organs from its influence; which is exercised, principally on that division of the muscular structure which is least employed, and which refuses to act, unless by sleep, and after relaxation.

Tetanus is seldom observed in the sequel of poisoned wounds. The specific inflammation that succeeds injuries of this kind, seems indeed, to operate on the system in prevention of the tetanic disease. Certain acrid vegetable principles, as the strychnos,

and upas tieute, when applied to fresh wounds, have, it is well known, in repeated instances, induced a spasm general through the muscles, which has ended rapidly in death; but, in such cases, the entire system is at once affected by direct admixture of the poison with the blood.

There is not, as far as I can ascertain, a case on record, of locked-jaw following inoculation by the small-pox or vaccine virus, or occasioned by the punctures and other ugly injuries incidental to anatomical pursuits*. From what has been observed of the general habits of this disease, it might be expected occasionally to present itself in sequel of the accident, commonly known as the "bad arm after bleeding." That it does not occur in these frequent cases of ill-conditioned puncture, may in some measure depend on the pre-occupation of the system by the inflammation, or other active disorder against which the lancet was employed.

In all cases where tetanic symptoms supervene on local injury, the nutritive powers of the damaged structure, involving the general material of the circulation, have been engaged in a long and active process of repair. On wounds that heal completely by the first intention, tetanus is seldom, or ever known to follow.

If tetanus be a disorder especially of the "nervous system," it is of the nerves for the most part sound

* I am informed by Mr. Samuel Lane that an instance of this kind has lately fallen under the observation of Mr. Bennett Lucas.

in their structure, and unimpaired in their general functions. During the tetanic paroxysm, while sensibility is often increased, the mental faculties are seldom impaired. There is, indeed, no other disease, like tetanus, generally and rapidly fatal, with which the nerves are apparently so little concerned. The only imputation that lies against them, is from the symptom of spasm, consequent on the local injury, in the traumatic variety of the disorder. But, it will be remembered, that, in such cases, the entire material of the structure is involved equally with the nerve in the effect of such local injury. A portion of the blood is disorganized by every bruise, and the smallest cut, that bleeds, implies the rude contact of a foreign body with the living particles of its fluent and continuous mass. The blood entire, is sensitive, as the individual nerve, of external impression, instantaneously and simultaneously perceived through all its distributions. Not so the "nervous system."

Surely there would be more of tetanus, if mere irritation of the nerve were sufficient to induce the disease. The nerve may, in truth, be passive rather than active in the pathology of tetanus; refusing a function, where it has been supposed to supply an irritation.

If, where tetanus succeeds to local injury, we could be induced to regard the symptoms as depending exclusively on "irritation of the nerve" of the injured structure, such theory of the disease would utterly fail us in the explanation of its idiopathic varieties.

Tetanus is occasionally developed in frames of the

soundest structure, and of which the nerves are one and all unharmed by external injury of any kind. In such cases, if we relied exclusively on the nerves for the explanation of the symptoms, we should be compelled to assume as general, throughout the nervous system, the "irritation," which in the traumatic tetanus had been confined, under the same theory, to the filaments of particular nerves. Of the existence of any cause capable of determining a general "irritation of the nervous system," excepting by the agency, universal and intermediate, of the blood, we have no proof in idiopathic tetanus. And were such cause admitted, the question would still remain, how and why it should be specially developed by effects of spasm and rigidity in the voluntary muscles.

There is a terrible illustration of idiopathic tetanus recorded by Dr. Penkivil of Yeovil, in the *Lancet* journal, of January 1, 1842. A studious, sensitive, overworked clergyman suddenly becomes the eye-witness of a suicide by cut throat. Some weeks afterwards, late in the cold wet autumn, he is unable to swallow his supper. On the following morning, November 9th, and during the day, there is painful stiffness of his neck, and the dysphagia continues. At night he is repeatedly awakened by getting his tongue between his teeth, which is bitten as he drops asleep. When visited for the first time by his medical friends at 8 A.M. of November 10th, he was the subject of confirmed tetanus. His features were disguised by a sardonic grin; the jaw at times was completely fixed. The motions obtained by medicines were dark and

offensive. On November 11th, the symptoms were all much aggravated. There was a dread of fluid, as in hydrophobia, and there had been no sleep. The tongue was swollen, ulcerated, and bleeding; a thick tenacious mucus constantly exuded from the mouth. The skin was bathed by a copious dense perspiration, exhaling a peculiar odour. The voice, though labial, was distinct. The sensibility was unimpaired; the mind entire. Late in the day, twitches of the arms, with slight opisthotonos, were first observed, and the pulse was at this time much hurried. During the night the spasms were aggravated into violence, and the unhappy sufferer, still perfectly sensible, was agonised by pain, Early in the morning of November 12th, after suddenly sliding from the bed, he stood for some minutes erect on his feet, immovable, and feeling "cold as a statue;" then passed by instantaneous collapse into death, in forty-eight hours after the case had been first brought under treatment. He had been freely purged by elaterium and croton oil in the first instance; and had taken calomel with morphia in repeated doses during the last twenty-four hours of his life. On November 11th he was bled to fainting. The blood was not buffy, and its clot was loose.

In the difference of individual liability to the attacks of traumatic tetanus after similar circumstances of local injury, a law of exception, by causes affecting the system through the blood, does in truth seem to prevail. There is reason to believe, that tetanus, like certain other fevers, is less readily developed under the influence of acute disease pre-

existing and active in the system. In a large majority of instances, those attacked by the disorder in its traumatic form have been in the apparent enjoyment of health previously to its invasion; for, from the healthy exercise of the muscular functions, the injury by which the tetanic symptoms are occasioned, for the most part proceeds. The selected class-victims of tetanus are the soldier and the labourer. It will, however, be found, on a close examination of individual cases, that chronic disorder of the health often attaches to those who, under accident, become the subject of tetanic disease. Both the noblemen, to whose death by locked jaw we have made previous reference, were habitual sufferers from gout. A case illustrative of this principle was brought under the public notice, incidentally to a discussion in the House of Commons in the session of 1835.

A marine, at Chatham barracks, received, under sentence of court martial, 138 lashes in the usual way. Sloughs appeared on the back, on the fourth day after punishment, which were succeeded in ten days more by locked-jaw and death. From the length of time that had intervened between the punishment and the appearance of the tetanic symptoms, it was assumed, by the more eager advocates for the lash, that the fatal result was induced by a peculiar state of the constitution, in no way dependent on the lacerations of the back; and in support of this view of the case, it was further urged, that the man was of violent temper, and irregular in his habits. But it should be remembered by military tribunals, that the flogged soldier is

generally a drunkard, and therefore, to this extent at least, in a bad condition of bodily health at the time of his punishment. The sufferer in this case died, in truth, of his wounds. His sentence proved to be one of death in its most horrible form; and should the practice of military flogging be frequent as heretofore, other similar cases will assuredly occur. On this subject, it may here be mentioned that, in some few instances, malignant tumours have appeared in the cicatrices of wounds inflicted by the lash, implying a further argument against this revolting description of punishment. In certain states of bodily health, and at certain times and seasons, no local injury is too slight for the production of tetanus in its most severe constitutional form. A careless lash across the cheek by a whip has been known in this way to kill. There is a moral here in medicine; to the violent it teaches forbearance, to the careless caution; on all it inculcates humanity.

TREATMENT OF TETANUS.

False in theory, and generally fatal in its result, the treatment of tetanus by remedies exclusively designated as "nervous" and "antispasmodic," should, with much else that is ruled in medicine, be subjected to immediate and complete revisal.

Everywhere controverted by facts, though as yet unchecked by reflection, the tetanus of surgery as of physic, pursues its course of fatal error, nerve-ridden to the last. The result, by practice, has been the amputation of limbs for the cure and prevention of symptoms, of which, amputation is known to be a frequent cause; and, that many, of whom it is not certain that they would have died in the tetanic spasm, have perished under the narcotism of its remedial poisons.

How little thought is taken in this country of tetanus as a disorder of the entire system, is in this sufficiently illustrated, that for its treatment the physician, so called, is seldom made responsible. Proceeding, in nearly every instance, from local injury, it is consigned to the surgeon in charge of the wound, from which it is supposed exclusively to originate. Now, without insisting unduly on the conventional division of labour, established in our hospitals and other public institutions, it must surely be admitted, that the spasm, which thwarts the will in every muscle, and threatens the life of every structure, if worthy of the surgeon's best care, is nevertheless

essentially the physician's disease. Certainly, it deserves all the thought and all the practical knowledge that can be brought to bear upon it from every branch of the medical community, and, in the general interest of all, should not be engrossed by one section alone.

A distinguished medical coroner is reported publicly to have declared, on a late inquest of "death from locked-jaw," the utter inefficiency of all remedial means hitherto employed in the treatment of this awful disease. Yet let us not be discouraged. There is in tetanus, if it may be so expressed, a principle of cure. Following, as it does, on the slight injury of structures comparatively unimportant, and developed principally in organs of an occasional and accidental function, there is an open presumption, that, by the countervailing agency of medicine, it may be prevented and suppressed.

The simple fact, that strychnia can, in a few seconds, induce tetanic symptoms of equal severity with those which are observed to follow on local injury after the incubation of many days, gives fuller warrant to the hope that the disease may be made to cease, as it is invited to begin, under the rapid and pervading influences of the general circulation. If tetanus, like fever, produce its effect on the system, by spoiling certain principles in the blood, or by prejudicing it in the discharge of any of its living functions, surely we need not despair of renewing the materials, and supplying the agencies by which health, through the circulation, may be restored. A specific remedy will still be found for this disease, which, by a special poison is unfailingly

produced. The antidote to strychnia would be the cure of tetanus.

The ordinary treatment of tetanus is directed almost exclusively to the prevention or control of its muscular symptoms; but the tetanic spasm, though distinctive of the case and measuring its severity, does not constitute the disease. Tetanus, we have seen, is the crisis of a great constitutional disorder, determined in the blood and vital organs, as in the fibre of the voluntary muscle. By analogy with the other functional operations of disease, there is, no doubt, a purpose, beyond that of mere suffering, in this wrestling of the flesh against the will; an effort of revulsion, if not directly curative, yet not adverse to the principle of self-recovery.

Opium, from its supposed antispasmodic power, is the drug on which physicians have most relied in the treatment of tetanic disease; but, of tetanus spasm is merely a part, and even against the spasm of tetanus, opium does not in truth prevail. Yet, from the well-known qualities of this drug, there was originally a full warrant for its use. It brings sleep, and sleep is the state of muscle most opposed to that of spasm, by which tetanus is principally characterised.

Again, on the wide constitutional view of the disorder, with no especial reference to its pain, or to its spasm, opium must have afforded a fair promise of relief; for opium is a great constitutional remedy,—a medicine of more than nervous influence,—affecting the nerves, it is true, severally, or in combination; but affecting them, with all other structures, through

the common medium of the blood. Had opium never been given in tetanus, its use, on general principles, would be well authorised; but, as in every dose and in every form, it has hitherto proved ineffectual in combating the disease, no mere theory of its operation would justify the continued administration of it. Opium, it should here be remembered, has frequently been known to occasion tetanic spasm in the double muscles of those who have perished under its influence. There is, perhaps, more direct evidence of its spasmodic than of its antispasmodic power over the contractile function of the voluntary muscles. In respect of tetanus, we have too much reason to believe that opium has, in many cases, aggravated the symptoms, and prevented recovery.

COLD AFFUSION IN TETANUS.

In some instances of this disease, recovery has succeeded the large and repeated use of cold water by affusion to the skin. The good effects which have occasionally followed the application of this simple remedy, seem to have depended principally on its power of rousing and sustaining the movement of the blood in the vessels. Cold affusion is never more efficient than in syncope, or when employed in counteraction of the narcotic principle, whether natural or adventitious. So powerful and immediate is its agency, that we can hardly consider it as operating by a mere effect of contact, on the cuticular nerves

subjected to its impulse. From the slightest mechanical impression on the nerves which share in the organization of the skin, strong action of the voluntary muscles may assuredly be induced. The convulsive laughter, and jactitation of the limbs, which follow the titillation of certain surfaces of the body, are familiar illustrations of this principle of cutaneous sympathy. But from the dash of cold water upon the face and body, more than mere muscular effects are in many instances known to ensue. It is, when the moving forces of the circulation are in abeyance,—when the blood itself is most charged with narcotic principles,—that the cold affusion most powerful and advantageously affects the system. It is through the blood in mass and in current, there is reason to believe, that such effects are brought about. The skin confessedly employs a large portion of the blood in general circulation through the body at any given period of time, which, there in the skin, as in the lungs, may be considered as brought into direct contact with the external agencies of matter. Thus, heat and cold, the electrical properties of air, water, and the other surrounding media, directly influence the great material of the circulation in its functions and elementary composition, through the skin. By mechanical agency, as by friction, or by the forcible impulses of affusion, the effect of such influence is accelerated and extended. Water, it will be remembered, in reference to its possible effects on the living body, is, under its designation of "simple element," a combination of active chemical principles of vital

and constant necessity in the system, maintaining relations, many and peculiar, with the blood. The re-agency of these fluids, when suddenly brought together by force and under expansion of surface, involves, it may be assumed, an alteration of more than temperature in the warm living blood, with a corresponding development of action throughout the several structures under its influence. There may be a water-cure by the true physician, as by the exclusive hydropathist.

PURGATIVES IN TETANUS.

From the obstinate constipation which generally accompanies the tetanic spasm, and by analogy from the relief afforded by spontaneous purging to the cramps of the epidemic bowel-complaint, there is a seeming warrant for the employment of strong purgative medicines in our encounter with this disease. Some good evidence has been put on record, by well-authenticated cases, in support of this rule of practice.

Not long since, a severe case of traumatic tetanus was reported by Dr. Golding Bird, at one of the Medical Societies, in which the symptoms were repeatedly alleviated by large doses of castor oil. The immediate effect of the medicine was to bring away large quantities of thick and tenacious mucus, which could be drawn into pieces exceeding a foot in length. The urine at this time was highly alkaline. On the eleventh day from the invasion of the symptoms the

patient was rapidly improving. The result of this interesting case has not, I believe, been published.

On the same principle, as it would appear, of relief by excretion, the tetanic symptoms have occasionally been observed to yield, under the profuse sweats of the hot-air bath. This is the cure in practice among the Gauchos of South America, where tetanus is endemic. They carefully wrap the patient in a warm freshly-flayed hide, and leave him there to sweat. The late Mr. Walker, of St. George's Hospital, informed me that, in a conversation with M. Roux, of La Charité, a short time back, he was assured by that distinguished surgeon, that in the only instances of traumatic tetanus, under his observation, which had not terminated fatally, he attributed the recovery of the patient to the use of the hot-air bath.

In a case of this disease, of which Mr. Walker invited me to witness the treatment, in the autumn of 1841, certainly the use of the hot-air bath appeared for a time to lessen the severity of the symptoms; yet with no ultimate benefit to the patient, who died on the eighth day after the invasion of the tetanic spasm. The sufferer was a man about thirty years of age, of dissipated habits, impoverished, and long out of work. He was admitted into St. George's Hospital on September 19th, having punctured the sole of his foot with a nail, about a fortnight before. A week after the accident, he felt "pain and stiffness coming on under the jaws and along the back," and, though "not feeling bodily ill," took to his bed. When I first saw him, on the morning of September

20th, he complained principally of "pain by tightness" of the abdominal muscles, which were hard and uniformly tense. The arms and legs were neither stiff nor convulsed. There was no pain under the scrobiculus cordis. The jaw was partially closed, and he had little power of protruding the tongue, which he had twice or thrice convulsively bitten. The wound of the foot had suppurated freely, and was very nearly healed, with no present discharge. The pulse was between eighty and ninety. The bowels had been opened on the previous evening. There was frequent micturition, with some dysuria. Of this last symptom the patient complained; but of little else, excepting "a stiffness of his belly and jaws." He had been under medical care since the occurrence of the accident. A grain of morphia, with a turpentiue injection, had been prescribed for him immediately on his admission into the hospital. No opium, in any form, was afterwards given. On the following day, after the hot-air bath twice administered, the patient, having been freely purged by elaterium, and moderately bled, still complained of "much pain along the back," and of some in the lower part of the belly. The abdominal muscles had become soft, the mouth more open, and the tongue was more readily protruded, but the legs were at times drawn up by spasm, and there was opisthotonos. The patient "felt no better,"—his aspect was much distressed,—and he expressed his belief that he should not recover. The pulse had become rapid; there had been no sleep. The bowels were open, and the urine free. The blood drawn on the preceding day, was much

cupped and buffed. At two o'clock in the afternoon of September 22nd, the patient expressed himself "better," with less spasm and less general distress, although he had not slept. At six o'clock on the same evening, after a vapour bath rather unduly protracted, he "had a fit," in which, by the nurse's report, he lost his senses, and became black in the face. Immediately before this epileptic seizure, the jaw had suddenly opened, and he had invited the attention of his mother to the relief thus obtained, with a loud exclamation of joy. To the fit succeeded a paroxysm of tossing and groaning: he then became comatose, and on the same evening died.

Upon examination of the body, on the following day, a small abscess was found beneath the plantar fascia, containing a piece of leather, which had been forced in from the wound. The heart, excepting that a little fluid blood remained in its left ventricle, was empty. During the twenty-four hours preceding his death, some wine, and saline medicines only, had been administered to this patient. A small quantity of blood, taken by a second bleeding from the arm, again exhibited the buffy coat, but in a less degree.

From the proved effect of certain gases, by inhalation, on the contractility of the voluntary muscles, there is sufficient encouragement for the use of these powerful agents in the treatment of tetanic disease. Oxygen, the nitrous oxide, or even alcohol, might thus be introduced rapidly to the circulation, in cases where deglutition had become impossible. The

spasms incidental to the disease would prevent the safe injection of medicines into the veins; but from surfaces scarified for the purpose, much absorption of the necessary remedial principles might be effected. There is a general indication for means that stimulate and support, in the treatment of a disease which seems to destroy principally by exhaustion. Wine and quinine, in the opinion of the writer, might be given with advantage, in full and repeated doses, even in the early periods of this complaint. Alcohol, we may here remark, when it kills, induces the state of muscle directly opposed to that under which the patient in tetanus expires.

A middle-aged female servant, known to the writer from his infancy, swallowed nearly a pint of gin at a draught, in despair at the feelings of humiliation to which, by previous habits of drinking, she had been reduced. She was found shortly afterwards, in the sitting posture, without sense or motion,—her eye-lids closed,—her lips blue, and her face lying forward on the table. In this state of anti-tetanus, with every muscle entirely resolved, yet by others unstretched, she continued to breathe, for nearly two hours after she could be said to live.

From the analogy, by symptoms, of tetanus with chorea, we receive a further suggestion of reliance on the use of drastic purges and tonic alteratives in the treatment of both diseases. A case was published in the *Lancet*, of August 15, 1840, by Mr. Eves, of Cheltenham, in which the recovery of the patient was attributed to repeated doses of the croton oil, with the free use of Madeira wine.

CHOREA.

Here, in chorea, is a further illustration of the prevailing error of modern physic, under which, spasm and all symptoms of muscular disorder are referred exclusively to a supposed condition of the brain or spinal marrow. Chorea, like tetanus, is a disorder of the entire system, and does not proceed specially from the nerve, though expressed principally by the muscle. That chorea is more than merely "nervous," we learn from the causes in which it originates; from its symptoms in their extent and variety, and from the means that effect its cure. And thus, it seems to the writer, the chronic varieties of chorea find a more easy and rational explanation in the undue relations, necessarily frequent in certain habits, between the blood and fibre of the entire muscle, than in a distinct irritation of its nerve where organized in the brain. Under the received "nervous theory" of this disease, how can we reconcile the incessant twitchings of Samuel Johnson's giant limbs as simultaneously possible with the undisturbed concentration of his intellectual faculties? We may hardly suppose that every oblique movement of an illustrious statesman's nose is timed by a corresponding impulse originating in the recesses of his brain.

There is further proof of the constitutional importance of this disease. It sometimes ends in death. Known to the vulgar under a fantastic name, it is not by them regarded as a "dangerous complaint;" and,

from the false principle of its pathological classification with the "neuroses," it is too often confounded, even by physicians, with illness of a comparatively trivial nature.

Chorea is not, in all cases, well distinguished from other disordered states of the voluntary muscle. It may be epileptic, hemiplegic, or even tetanic in its character. With hysteria, as the term is now understood in medicine, it is in certain temperaments inextricably confused. But the differences, assumed on conventional authority, in the nomenclature of functional disease, will at times be disregarded by the practical physician, who deals with each case truly, and according to its separate merits. Because, in most cases of chorea, there is more spasm of one side than of the other, it is not to be inferred that the disease is of local nervous origin. There are differences, besides those proceeding from their central nervous influence, which attach to the double symmetrical muscles of the body; affecting their function and habits, and beginning in the nutrition of the structures themselves. Each particular muscle, it has been observed, in respect of its growth, and, to a certain extent, of its contractility, may be regarded as a distinct animal, independent of all agencies but those of the blood. Again, from long preference of use, as of the right side over the left, the voluntary muscles, severally or in sets, are affected very differently under the same principle of disease.

The spasm of chorea is peculiar, affecting the voluntary muscles only, and, in the large majority of

cases, at a period previous to the full development of their growth. It is preceded in most instances by evident disturbance of the general health; it begins with febrile symptoms, and is constantly associated with an impaired state of the alimentary functions. Its subjects are, especially, the ill-fed children of both sexes, (ill-fed, it may be, because over-fed,) when engaged in the process of their second teething, or while passing through the course of their puberty to juvenescence.

The attacks of chorea are intermittent, observing for the most part a quotidian type. It disturbs the muscle in its waking function, but is suspended by sleep, to which it again succeeds. Here is the great and peculiar interest of this disease. It resists volition in the very structures where power by will is most expressed; and survives the counteraction of sleep. The physician is never more impressed with the admirable mystery of sleep, than when he observes it predominant in the muscles over the unruly violence of chorea. In the tranquil features and motionless limbs of the peaceful slumbering child, he scarcely recognises an identity with the little demoniac patient under his daily care.

How widely the disturbing influence of chorea extends through the system, is best illustrated by its effects on the moral constitution of the patient. During the continuance of this disease, the character of the individual sufferer appears in some instances to be entirely changed. In a case of extreme severity, which I attended in the summer of 1838, a violent

and most unwarrantable dislike was suddenly conceived by a young lady of sixteen towards the female attendant who had been for years about her person. This illusion of angry feeling was expressed with almost maniacal intensity of word and gesture. The peculiar fretfulness of temper, and unsteadiness of purpose remarkable in most cases of this disease, are not a mere result of its spasm, by irritation and exhaustion of the frame; for they precede the symptoms of irregularity in the muscular function. A child about to enter on the dance of St. Vitus, will be reported by its attendants as strange, captious, or "not itself," for days or weeks before it betrays any evidence of fidget in its limbs. And further, when the spasm is actually established in the voluntary muscles, it does not necessarily determine, by its severity, a corresponding degree of disturbance in the mind and temper of the patient, who, unable to restrain his movements, seems, in some instances, almost unconscious of their existence. It is, indeed, a frequent matter of surprise to the physician reflecting on particular cases of this disorder, that such violent displacement of the limbs should be accompanied by no expression of pain, and seldom by any immediate sense of annoyance.

A little girl, eight years of age, became my patient in January, 1840, who had suffered for some months from severe muscular pains in the limbs, which entirely ceased, on the appearance of the spasms of chorea. Sleep, which had long been prevented by the intensity of the pain, then returned. In this severe case, the

speech was for some days interrupted, and there was an involuntary discharge of the contents of the bowel. The symptoms of chorea had been fourteen days present, when she came under treatment, on January 29th, and had entirely subsided on February 15th. She was freely and frequently purged, and, when convalescent, was dashed with cold water, and took half an ounce of steel wine daily.

There is, in chorea, a consistent waywardness of mind and muscle; not, by consequence of one from the other, but following, in both, from causes that prejudice the constant and universal business of nutrition. Though uniform in its effect, by spasm, on the voluntary muscle, chorea is not always the result of causes similar in their primary operation on the general health. In certain temperaments, and at certain ages, it would seem that any great disturbing influence, either moral or physical, is sufficient to induce the disease.

Chorea, in my own observation, has been known to occur in sequel of small-pox, acute rheumatism, the scarlet fever, and other forms of severe constitutional illness. In the summer of 1836, I had a case under my care, in which the patient, an unmarried female of fifty, had contracted the disease by exhaustion, some months after the long anxious nursing of a sick father.

A young English lady, while travelling on a winter's night in France, was compelled, by the accident of an overturned carriage, to remain for a considerable time unsheltered on the public road.

Thus pacing up and down, in a state of discomfort and alarm, she encountered the further shock of seeing her path suddenly crossed by a wolf. Immediately afterwards, she was attacked by a "jumping," so described, with much pain of the right arm and leg, which had continued without intermission for a month previous to her first consulting me on March 24, 1840. She had then been only six weeks married. Her manner was very hysterical; the catamenia were suspended, and there was much occasional sickness, with general exhaustion of the system. Here then, was chorea in an adult female, ensuing in sequel of numerous disturbing influences not exclusively confined in their operation to the nerve, but affecting, through cold, fatigue, terror, want of sleep and interrupted excretion, the whole business and material of the circulation. The patient was desired to remain much in bed, and in every way to rest. Her attention was a good deal withdrawn from her own sufferings, by preventing the excessive watchfulness and over-frequent inquiries of her anxious friends; and she took, by prescription, moderate doses of quinine twice in the day, with a quarter of a grain of morphia at night. Following these directions she soon recovered.

Beneath its mask of ever-varying grimace, chorea occasionally maintains, throughout, a character of severe and regular progression, by certain fixed stages, to its result. Like fever, it reaches a height, and runs its course. In about three weeks from its commencement, I have, in several instances, observed it thus to culminate, and then to decline. Thus recognised, in

its acute form, as a critical self-curing constitutional disorder, it affords another variety of the "muscle fever," of which, in tetanus, we assumed the type. and being a fever, it is subject to the accidents by which fevers are often complicated in their course. Though expressed principally, and at all times, by disturbance in the function of the voluntary muscles, it may become dangerous, by its effects, in organs of more vital importance.

This great constitutional character of chorea was well illustrated by the case, to which I have already referred, of a young lady aged seventeen, who was placed under my care in the spring of 1838. On April 22nd, when I first saw her, she had suffered for a week past from sudden, frequent, and involuntary movements of the double muscles, especially of those in connexion with the left side of the body. The spasms had been preceded by pain about the throat and jaws. Her manner was quick and irritable; the tongue was clean,—the bowels slow. Her general health was reported as having been for some time indifferent.

Three months before, she had suffered from rheumatic fever, since which illness, the catamenia had not again appeared. They had not at any time been well established. Two wise teeth were still wanting in the upper jaw. A large round worm had been passed from the bowels, when the patient was fourteen years of age. The father of this young lady was of a very nervous excitable temperament, and had been under my care for severe neuralgia of his one arm, having

lost the other in battle for his country. Much of his quick and sensitive nature was inherited by his child. On April the 25th, after free purging, and moderate doses of the Griffiths's Mixture, the symptoms of the case, both muscular and general, had become exceedingly urgent. The entire face was hot and suffused, with a wild frantic expression of eye and countenance. The spasm was no longer hemiplegic, but had extended, with equal violence, to both sides of the body.

From continual rude attrition with the furniture, every knuckle of the fingers was excoriated, and the hair was removed from the crown of the head in a circular patch, as if by a tonsure. The temper was most distressingly irritable, with a marked repulsion of all sympathy. Food was refused, and there had been no sleep. The bowels were still slow. Five days afterwards, the patient was reported by those about her as "much the same," with the advantage of getting some sleep, during which the spasm subsided. Small doses of morphia were now ordered, at short intervals, with the occasional repetition of jalap aperients.

On May 2nd the symptoms had begun to subside; and the patient from that time improved steadily, under the use of Fowler's Solution of Arsenic, alternated with sulphate of iron. On June 18th of the same year, I was again desired to take charge of this young lady, during a mild attack of scarlet fever, in which the rash was preceded by spasmodic twitchings of the hands and feet.

In watching the symptoms of this almost tetanic case of chorea, during some days I was not without fears for its result. It is known to every physician, that the dance of St. Vitus may sometimes lead directly on to death. A little girl, aged nine, became my patient in St. George's Hospital, on June 3rd, 1835, with symptoms of severe chorea, reported to have been three weeks present. There was no power of articulation, and the jactitation of limb was incessant. The child had been removed from a home, in which two of her brothers lay ill with small-pox; of which disease she presented some appearance, by a modified eruption on the back and shoulders. Under a treatment of active purging, with scruple doses of carbonate of iron, the little patient appeared, after some few days, to be improving. On June 11th, she became rapidly worse; and late in the evening of that day, rather suddenly, expired. A large round worm was found in the œsophagus, nearly five inches in length, and lying with its upper extremity opposite to the thyroid cartilage. The intestinal tube was in parts exceedingly vascular. Several dark circumscribed patches were observed in the lung, resembling what is termed by pathologists "apoplexy" of that organ. The dura mater was very vascular, and slight traces of opaque fibrinous deposit were observed on the surface of the arachnoid membrane.

These appearances were explained, by reference to a severe illness of "fever with pain in the head," which the patient had suffered three years previous to the attack of chorea. The brain, somewhat congested in

its substance, was otherwise firm and healthy. The heart and other viscera were sound.

Shortly after the occurrence of this case, I was informed, by Dr. Burton, of two recent instances, in which the disease had terminated fatally in the wards of St. Thomas's Hospital. A case was subsequently reported to me, from the practice of one of my colleagues at St. George's Hospital, in which the young patient had died after spasms, resembling in their character and severity the opisthotonos of tetanus.

A frightful case of this disorder, incidental to an advanced stage of pregnancy, is registered in the practice of Dr. Macleod, of St. George's Hospital, during the summer of 1841. The convulsive movements were first observed, in sequel of a fit occasioned by sudden terror, and hemiplegic in its character. With but little intermission, they were continually aggravated in severity, for two successive months; when the patient miscarried, and died.

Latterly, the chorea was complicated with noisy delirium, and unconsciousness so complete, that the poor sufferer gave no intimation to her companions in the ward, of the labour-pains by which she was prematurely racked. The newly-born infant was found on its mother's person by a nurse, during her vain endeavours to arrange the bed, and to restrain the incessant jactitation of the affected limbs. It lived only twelve hours; the mother died in two days. The subject of this sad case was a young married woman, who had borne a healthy child three years before the pregnancy which ended in her death.

On examination of the body, thirty-four hours after death, the lungs were found much congested, and filled with frothy mucus. In the heart, some of the fibrinous deposits, termed "warty vegetations," were observed on the auricular surface of the mitral valve: this I consider well worthy of note, in reference to the shock of terror with pain and oppression of the chest, which had preceded the attack of chorea. The brain and spinal marrow, carefully examined in all their divisions, presented no appearance in explanation of the spasm or other symptoms of the case. There was some venous congestion of the upper surface of the brain, but no effusion into the venticles, or between its membranes. The uterus had contracted to the size of a full-grown fœtal head. The right kidney and ureter were wanting in this body.

In specifying those few instances of chorea fatal in its result, (a truth in pathology, of which, by very slight research, examples might be largely multiplied,) it has been my object to represent the disease as essentially constitutional in its nature, and, therefore, as always deserving of the physician's serious attention.

One other case may be recorded in further dismal illustration of this remark. A young gentleman, aged thirteen, was brought to my house, on the morning of October 5th, 1840, with severe chorea affecting the voluntary muscles of both sides of the body, and reported of about ten days' duration. On September 26, while at school, he became unusually silent; and was observed to be continually engaged in unbuttoning his waistcoat, with general restlessness of manner. For some weeks previous, his temper, naturally quick, had been

remarked as irritable. The boy's health had always been considered delicate. On October 10th, when he was again brought to me, the spasm of the limbs was much aggravated, and he was unable to articulate. On October 13th, I was summoned to him at his father's home, and found him convulsed, as by tetanus, or hydrophobia. His face was frightfully distorted; his tongue, black and dry, was forcibly protruded. By the violence of the spasm, he was thrown repeatedly from the couch, on which he found no sleep. He was continually rending his clothes, and howling as if in agony. Yet he acknowledged no pain, when questioned, by gesture. The abdomen was not distended, or tender on pressure. The motions obtained by medicine were dark. He continued, at intervals, to swallow small quantities of food. At seven o'clock in the evening of the same day, the nineteenth from the commencement of the symptoms, after lying in a state of comparative stillness for two hours, he expired, apparently from exhaustion. For some days and nights he had enjoyed only two hours' sleep; during which, the spasm entirely ceased.

The treatment, in the first instance, was by brisk purgatives, with tonic alterative medicines, including the Fowler's solution of arsenic. Latterly, morphia was given in small and repeated doses; but with no effect of alleviation to the intensity of the spasm. An examination of the body was not permitted by the parents of the child. This case, at its close, was unutterably frightful and distressing; to bystanders recalling the Scriptural image of being "possessed by a devil."

CHOREA ASSOCIATED WITH SKIN DISEASE.

There is often much disorder in the functions of the skin, coincidently with the spasm and other symptoms of chorea. Its surface assumes a dull muddy tint, becomes dry, and is unequally warmed. In a very severe case of the disease that fell under my care in St. George's Hospital, during the winter of 1841-42, the hands and arms were thickly coated by dark rough irregular crusts, with cracks, and ulcerations beneath the fissures. Of defective animal nutrition there was further evidence, in this case, by marginal ulcerations of the lips, nostrils, and eyelids. As the spasm subsided, the skin cleared, and the ulcers healed. The subject of this truly frightful case was a little girl twelve years of age. Three weeks before her admission into the hospital, the symptoms, at first slow in establishing themselves, had been greatly aggravated by a sudden fit of terror. She had no power of articulate speech, and had lost all command over the bladder and rectum. The distortion of the face and eyes was incessant. During the last week of December, the child was in urgent danger of sinking, from sleeplessness and utter exhaustion. There was a continual rotatory motion of the head; and the jactitation of the limbs never ceased. These alarming symptoms were not alleviated, until after the frequent exhibition of morphia, in doses of one twelfth of a

grain, alternated, every four hours, with two grains of sulphate of quinine, and half an ounce of port wine. Under this treatment, which commenced on New Year's day, the child's health soon began to improve, and, on January 9th, she was safe on her way to recovery. The features of this little patient, when released from spasm, were with difficulty recognised by those, who had first noticed them in the crisis of her sufferings*.

SLOWNESS OF MUSCULAR CONTRACTION.

In direct contrast with the quick irrepressible movements of chorea, an extreme and morbid slowness is occasionally remarked in the contractions of the double muscles, though still remaining under the authority of the will. Jane Rutherford, aged 11, became my patient in St. George's Hospital, on November 18th, 1834. Two years before, she had been ill with typhus fever in sequel of scarlet fever; and, since that time, had been remarkably silent, and slow in all her movements. Complaining of nothing, asking for nothing, never stirring unless compelled, and unwilling to be disturbed, even for her meals, she had thus passed two years of her childhood in a state of constant torpor. During the month previous

* This child was re-admitted under my care into St. George's Hospital, in November, 1842, with symptoms of nearly equal severity. They yielded in about three weeks, under a plan of treatment similar to that already described.

to admission into the hospital, this lethargy of manner had perceptibly increased. At this time, her general health was tolerably good. Her pulse was 110,—the pupils of her eyes rather contracted,—and the expression of her countenance natural. She answered questions with sufficient intelligence, but with extreme slowness of articulation, and in a tone scarcely raised above a whisper. In walking, she moved her feet in regular alternation and directly forward, at a pace which, measured by the watch, did not exceed four steps in the minute. There was more difficulty in the extension than in the flexion of the limbs. Subsequently, a tremulous nodding of the head, with occasional twitchings of the muscles of the chest and arms, gave to the case a character of incipient chorea; but when the child left the hospital in June 1836, after varied and active treatment, there was very little improvement of the symptoms.

Another instance shortly afterwards occurred to me of deficient muscular energy, with exceeding slowness of articulation, in a young man about thirty years of age. From the early history of both these cases, I was induced to consider the muscular symptoms as dependent upon pressure, by thickening or effusion, in the central structures of the brain. There is a general analogy of character, in this tardigrade low-toned affection, with the impaired contractility of chronic hydrocephalus.

TREATMENT OF CHOREA.

The physician has much reason to be satisfied with the practice of his art in cases of chorea. The principle of its treatment is good; and the result, for the most part, successful.

The medicines of most approved use in this spasmodic disorder, are not of the class supposed especially to affect the "nervous system." Like the causes which induce the symptoms, they seem to operate for its relief, through the common material and general agencies of the animal nutrition. Acting as purges, they lessen irritation; and being alterative, are antispasmodic. Purging in chorea is good practice, but resting, as it does, with many, on a false and exclusive principle of "nervous irritation," it is often carried to a mischievous extreme. The waste following from excessive use of aperient medicines is, indeed, one occasional cause of chorea, and has often prevented its cure. Under all methods of treatment, the healthy nutrition of the frame, let it be remembered, is the end proposed. The bowels are set free, that the system may be better fed. In most cases of the disease, we can not do better at first than purge briskly and frequently. Under this simple plan, with a regulated supply of wholesome food, the symptoms, though severe, will often entirely subside.

Not long back, from my own inadvertence, a child in St. George's Hospital, suffering severely from chorea, was kept for many days longer than I had

intended on the "broth diet" ordered on his first admission. Under purging and the mineral tonics, the symptoms were continually aggravated, until the mistake in the diet-card was remedied by the substitution of the ordinary diet of meat and vegetables for broth and pudding; when the little patient began, at once and rapidly, to recover.

Impressed with the belief that chorea, in its acute, unmixed form, is a fever, tending, through its own symptoms, to its own cure, I still find myself relying much on the use of certain specific remedies in the treatment of this disease. The power of arsenic in the control of chorea is established in my mind, by the record of many cases in many years, as one of the strongest yet strangest truths of practical medicine. That Fowler's Mineral Solution has often lessened the severity, and shortened the duration of this disorder, there can be no doubt. And this, we should remember, is effected by a dose that is infinitesimal. Let no physician refuse the phrase. Though perverted, it implies the principle of the vaccine virus, with that of small pox fever,—of marsh miasma, as of plague by contagion. Of elements electro-chemical in their relation, by air or food, with the blood, who may presume to declare how much or how little is essentially necessary for the production of disease, or of the actions which are its cure? In the mass of the blood, by function as in composition, a slight re-agency may suffice for the greatest ulterior change.

It would be difficult to conjecture, by what inference of prescription the most deadly of mineral

poisons was first administered in this disease of impaired animal nutrition. That the little, squalid, emaciated subjects of chorea, should recover from the exhaustion of its spasm, and literally fatten, on arsenic and jalap, is a truth far beyond the apprehension of medical science, and inconceivable, excepting as a fact established by repeated observation. Here, as generally in the cure of disease, chance, we may suppose, has afforded a principle, which analogy has extended, and experience maintained.

Chorea is, for the most part, successfully treated by the mineral tonics; but every case of the disease is not always capable of improvement by these adventitious principles. Its symptoms are, sometimes, those of congestion in the brain and other vital organs; requiring measures of more direct and immediate relief than can be afforded by alterative doses of iron or of arsenic. Venesection would be most difficult, if not impossible, in the violent paroxysms of chorea; but there is, occasionally, a strong indication for the use of leeches to the chest and temples. Opium, if given with proper reserve, is at times of the greatest service, in gaining for the patient an interval from spasm, which might otherwise prove fatal by exhaustion.

All undue strain, by school-tasks, of the intellect, —all inordinate excitement of the spirits, should be removed from the daily life of the little persons who are liable to attacks of this disorder. They should not be suffered to contend for prize medals, or dressed against each other, for the nonce, as rival puppets of the fancy ball.

ABDOMINAL MUSCLES.

The great double muscles of digestion and respiration, designated by anatomists as abdominal, are specially influenced, in their contractile function, by many of the causes which operate through disturbance of the general health.

All muscles, it has been said, in their faculty of originating motion, and of self-adjustment, may be regarded as distinct animal growths; though feeding on the same current, and grafted by their nerves on the same common stem, yet independent, through the will, each of the other, and in their several freedom of action, prevailing at times, even against the will. This law of separate growth, with the power to live and act apart, inherent in all fleshy structures, is in none more evident than in the muscles which bound the great chambers of the pleura and the peritonæum. Continually engaged in regulating the admission of the air and food to the blood, the abdominal muscles are brought into immediate relation with the external agencies of matter from which all impressions at first proceed; and thus, from disturbance in their function, by causes acting from without, effects sometimes follow through the system, rapid and universal as those attributed to the central influences of the brain and spinal marrow. Much of general disorder begins in truth from these muscles, which is commonly supposed to originate elsewhere.

The active principle of certain fevers appears to be

specially determined to the great moving organs of respiration and digestion; affecting them, in some instances, by spasm; but more frequently by inefficiency of their contractile function. Strange deceptions are practised on the physician, in pursuing his diagnosis of abdominal disease, by the shifting irregularity of figure consequent on disturbance of the muscular function in this symmetrical division of the body.

Under the disturbing influence of hysteria, which is most evidently expressed in parts that are ordinarily subject to the will, the abdominal muscles often suffer an undue expansion of fibre, or simulate, by their partial and unequal contraction, the character of subjacent organic disease. In these structures, many effects of emotion, especially those of a depressing kind, are first physically felt.

Excepting in the passive effect of pressure and by distension, the abdominal muscles are under very few influences from what happens within the boundaries of the peritonæum. It is matter of frequent surprise to the physician, that so little action is determined in these ready and sensitive structures, from inflammation the most active of the serous membrane by which they are invested, or by ulceration of the subjacent bowel. When, (as in tetanus, or after the introduction of certain poisons to the stomach,) the abdominal muscles are entirely stiffened or partially knotted by spasm, such effects follow, not from "nervous sympathy" of the contractile fibre with the mucous membrane of the intestine, but from the wider influence of the poison in general circulation through the system.

In Lead colic, when induced by the slow absorption of the mineral from the skin or by the lungs, there is no reason to believe that the spasm of the abdominal muscles is directly consequent upon any special action of the poison on the mucous surface of the bowels. The constipation and belly-cramp incidental to this disease, are effects of disturbance in different structures, from a cause that is common to both.

In the epidemic British cholera of autumn, abdominal spasm is coincident with a directly opposite state of the bowels. No irritation of the mucous lining of the bowel is, in itself, sufficient for the production of spasm in the abdominal muscles. They must be prejudiced in their own nutrition, before they can be cramped. In the spring of 1839, I attended, during his short and fatal illness, a gentleman of robust frame, florid and healthy in appearance, who died from sudden escape of the contents of the duodenum, through an ulcerated opening, into the peritoneum. During sixteen hours of mortal agony, he suffered no cramp.

In a case of more recent occurrence, a married lady, aged thirty-seven, enjoying good health, and some months advanced in pregnancy, was attacked, at a late hour of the night, by sudden agonizing pain in the right side and upper part of the abdomen. On this evidence of local mischief, strong universal convulsions, with fits of unconsciousness, supervened—the bowels refused to act under medicine, and the patient expired, in about fourteen hours from the commence-

ment of her illness. She had more than once expressed herself as free from all pain during the intervals of the spasmodic paroxysm. No examination was permitted after death; but, from the suddenness, severity, and fatal rapidity of its character, there is reason to believe, that the case was one of rupture, by ulceration, of the bowel. From the puerperal agencies in simultaneous operation on the system, it would seem that the muscular symptoms received their great incidental development.

It is not only when rendered inflexible by spasm, that these muscles require the close attention of the physician; but still more frequently, in their various states of relaxation, as interfering with their passive mechanical use of containing and sustaining the several vital organs of the body.

From their inability at once to renew the supporting pressure that has been removed from the abdominal viscera by sudden expulsion of the contents of the uterus, parturient women have been known to faint and die. The operation of tapping for dropsy, is occasionally fatal from the same cause.

As the principal stays and binders of the human frame, these muscles are employed unceasingly in supporting weight and resisting pressure from all that is lodged within the chest and belly. By their thoracic attachment, they directly influence the business of the chest, under all circumstances of disease. Beneath the diaphragm, should they fail in their supporting power, the functions of the several viscera are no longer healthy or complete. Let any one suddenly

withdraw the support, given by his hand to the lower part of the abdomen in his own person, and, by the sense of what falls within, he exactly measures the degree and extent of the internal pressure. Sea-sickness, there is reason to believe, is in this way occasioned, by want of tonic resistance in the abdominal muscles to the passive weight of the collected viscera, suddenly disturbed in their respective positions, and gravitating with the motion of the vessel. By continual practice in this duty of ready adjustment to a varying centre, the seaman learns to command his stomach, while he "finds his legs."

In weak frames, the abdominal muscles are sometimes overpowered, even under the ordinary circumstances of breathing and digestion, by the weight of the contained viscera, and by the counteracting force of distention in the tubular cavities which afford passage to the air and food. The tone of these muscles suffers, more than is commonly supposed, under the exhaustion of general illness, and should always be considered with due reference to the context of symptoms that make the case. That, when overstretched by the gravid enlargement of the uterus, or by the effusions of disease, they may, for a time, lose the faculty of re-adjusting their dimensions, is matter of daily and familiar observation. The simple mechanical remedy, of which the necessity is by all admitted, after child-bearing and the operation of tapping, might with advantage be much more extensively employed in the general treatment of disease. There is scarcely a symptom of functional disorder in any of the great

organic divisions of the body, which may not occasionally be relieved, by giving mechanical support to the lower muscles of the abdomen. Headache, cough, relaxation, or habitual constipation of the bowels, that have resisted all approved means of medicine internally administered, have, in the end, been cured, by the uniform pressure of a lower supporting bandage. The effect here, is, not that the muscle is superseded, but that a fascia is supplied. Time is thus obtained, by the removal of weight below, for the upper muscular fibres to recover their healthy tone and full power of contraction.

EFFECTS OF DRESS ON CERTAIN MUSCLES OF THE FRAME.

It is not here intended to raise the great question of female privilege that, in a medical treatise, would be at once implied by the mention of ladies' stays. Whatever be the claim of health, in the right and usege of woman's dress its plea would not prevail. These are the vested interests of fashion, which were never yet conceded to physic. Indigestion, with all its miseries,—congestion, which rapidly becomes inflammation,—or is gradually developed into chronic disease, according to the temperament of the individual, are among the frequent results of a pressure contrived to prevent the elastic uplifting of the lower ribs; which closes the broad base of the lung against air, while it stuffs the heart and large vessels with unven-

tilated blood. Enough has been said of the dangers of tight lacing:—that it is most dangerous, every woman knows; but woman is not frighted by danger from what she wishes to have, or wills to keep. By this foreshadowing of distant and contingent mischief to the health, the physician would vainly hope to prevail with his fair client that she should break her bonds asunder. Let him rather direct her attention to the mottled necks, red ears, red elbows, and red noses of her fellow martyrs.

Modern Europe affords a further illustration of this most unclassical retrenchment of the waist, in the model forms of a less interesting section of its society. With certain middle-aged gentlemen, who have dressed well, and are losing shape, a practice is known to prevail, of girding themselves for the *pavé* with a central stay, rather inaptly designated as a "riding belt." Even the athletic young, on supposed conservative principles, are, not unfrequently, thus accoutred. Whatever may be the gain, from this improved moulding of the human form, to the eye of the bystander, its effect with the sufferer, is to displace the contained viscera, and still further to unbrace the containing muscles. These restrictions imposed on the pulse and breath, by our "habits as we live," are very characteristic of the egotism of high civilization. They are only tolerable by those who are safe from impulses of strong emotion, and who are too well bred to be betrayed into any sudden physical exertion.

MUSCLES OF THE THROAT.

All muscles, or rather all sets of muscles, are distinguished, by a temper inherent and peculiar to their fibre, in relation to the functions which they severally discharge. And the result, by combination, of this diversity of the muscular faculties, is the true expression of the individual temperament. How widely different are human beings from each other, in their aptitude for motion, and habits of voluntary exercise! and, in the muscles of the same individual, how various are the laws that govern their function of contractility!

Every muscle may be said to have a way of its own; and this separate privilege of action is specially acknowledged, by choking, in the throat. In the assemblage of organs thus simply designated, the double fleshy structure is greatest by extent, and rules the functions of the whole. They are the sentinel fibres of our busy compound frame, which here surround the common portal of the blood and breath. Their post, let us remember, is between the food and the stomach,—the air and the lung. Ever on the alert, yet seldom alarmed, they maintain safe right of way by challenge to all comers.

Spasm of the throat is often an effect of the undue irritability of its outer investing membrane, and is determined by causes apparently trifling in their consequences to the animal œconomy; as by tickling, with a feather, of the fauces; but it is, at times, an act

of immediate and vital importance,—the repulsion of elements directly noxious to life,—or the final expulsion from the system, of matters which the stomach has already rejected. The grave-digger declares, in evidence before the House of Commons, that, while working for his bread beneath the carrion strata of a London burying-ground, he frequently loses all power of his limbs; and that these attacks of muscular weakness are occasionally preceded by "a twang of coppery taste," with a sensation in the throat and mouth as of chewing a penny piece, which he is unable to swallow.

An interruption of the muscular functions of the throat is the exclusion, for a time, of all principles that are essential to the nourishment of the body; for not only is the gross material of the food admitted, by deglutition, into the alimentary canal at stated intervals of meal-times, but portions of air are thus continually passing with the saliva into the stomach; there, as in the lung, to be digested and respired.

While engaged in teaching anatomy, some years back, the writer was in the habit of insisting on this double relation of the mucous surfaces with the atmosphere, as it is breathed or swallowed. Placed beneath the elastic structures of the chest, subjected to the action of its muscles, and continually moving with the diaphragm, the stomach was always described, in the great business of respiration, as an organ supplemental to the lung.

Spasm of the throat, when not induced by direct irritation of its surface, implies, for the most part, a

pre-occupation of the system by extensive internal disorder; and, like other functional symptoms, is of salutary purpose, and protective in its result. Thus, in the paroxysm of epilepsy, or under the influence of strong emotion, when all vital action is at issue, articulation and deglutition are alike prevented. Food and words do then literally stick in the throat; and in such urgent states of great and general disorder, we may reasonably suppose, that a present advantage is actually obtained, while further prejudice to the system is prevented, by the exclusion, for a time, of all principles that task the powers of assimilation, and bring increase of volume to the blood.

It is not within our present arrangement, to consider the illustrations of muscular disorder which are afforded by hydrophobia, or by the more aggravated forms of hysteria. Interrupted deglutition is a pathognomic symptom of "the poison from the mad dog's tooth;" and a choking of the blood-current by hysterica passio in the breast, is unfailingly recognised by constriction with spasmodic uplifting of the throat.

MUSCULAR PAINS.

Excepting by the effort of involuntary contraction, the double muscles seldom suffer distinct idiopathic pain. Yet to these structures, by supposed effects of spasm and rheumatism, in the absence of other assignable cause, most pain is imputed. In reference to spasm, it has already been observed that this expression of physical suffering must be received by the physician from his patient with strict and cautious reserve.

Many pains, described in familiar phrase as "muscular," are not of fibrous origin; and of pain that is actually felt and tracked by the muscles, but little is in truth rheumatic. The sudden stroke of pain that occasionally thwarts the slightest attempt at contraction in the fleshy fibre of particular muscles, is in no way analogous to the joint-swellings and stiffness of rheumatism. It is especially felt in the muscles which connect the head and limbs with the trunk, as in the shoulders, neck, and reins, and seems to depend on a disturbing principle in the blood, rather than on the agency of cold, or moisture, from the surface. It has been observed, in some instances, to follow instantly on certain electrical states of the atmosphere, and has entirely subsided after five minutes' sleep, or the spontaneous action of the bowels. Abstinence and moderate purging will often effect its cure; but, like other irregularities of the

muscular function, it is occasionally symptomatic of serious and lasting injury to the general health.

At times, the symptoms of pain and inability to contract, thus suddenly developed in particular muscles, are of such urgent severity, as to render necessary the employment of means calculated for the relief of general and local inflammation. It remains a question, whether many of the severe neuralgic pains, so frequently encountered in modern practice, may not be a result, by expression, in the trunk and larger branches of the nerve, of inflammatory action in the muscular structure from which the nerve by its filaments arises. Certainly, on this principle, such local pains, by cupping, leeches, and blistering, are often the most successfully treated.

Distension of the bladder is often neglected for hours,—destructive ulceration of the uterus has been endured for successive years, in the belief, by hope, that the local suffering in the hips and lower belly is "entirely muscular." Abscess of the brain,—caries of the vertebræ,—disease by structural alteration of the heart or large vessels, have, in repeated instances, been masked, under the phrase of "muscular pains," from the more serious observation of the physician.

LUMBAGO AND SCIATICA.

Muscular pains are frequent in the loins; for muscles there abound. Indeed, from the lower back, nearly every movement of the trunk and limbs proceeds, and is determined. Thus, strength and weakness receive their primitive and most familiar illustration by terms which express a supposed muscular condition of the loins: and thus, the effect of disorder, by which the contractile function is impaired, is nowhere more evident than in the great double masses of flesh imbedded between the pelvis, the ribs, and the lower vertebræ.

The pain so often referred to the back, at the onset of fevers, especially those of the eruptive class, is an expression, by the muscular fibre, of a disturbing influence, pervading it in common with the other organised structures. It compels the horizontal posture, and sends the patient, unnerved and prostrate, to his bed. Severe aching pains, with stiffness of the lumbar and gluteal muscles, suggesting the belief of acute renal disease, are not unfrequently at once relieved by the removal of indurated fæces from the rectum.

Similar effects of local suffering are sometimes induced by hæmorrhoidal or other tumours confined within the pelvis. This indication, by pain, of internal pressure, is likewise, at times, afforded by the posterior

flexor muscles of the thigh. The sense of utter weariness, which occasionally surprises every muscle of the body during the paroxysm of hysteria, is felt with especial aggravation in the fleshy structures of the back and lower limbs.

SLEEP.

In our proposed investigation of the causes inducing spasmodic disorder of the muscles, there is, of necessity, a frequent reference to the phenomena of sleep. Nearly all that we know of sleep is from what we observe of its effects on the voluntary muscles. In these structures, it is a periodical necessity,—a part of their regular business; essential as contractility itself to the completeness of their function. In them, by physical evidence, it first begins, as it seems to cease. Sleep is, in truth, a function; of which the voluntary muscles are the organ. Through sleep, the voluntary muscles, like the heart and lungs, are vital in the body. It is not enough that our limbs should rest. If they do not sleep, we die.

There are no effects of sleep on the senses, which may not be explained by its previous occupation of the double locomotive structures. Thus, slumbering, the eye refuses light; the voice becomes inarticulate, and the ears are closed against sound; the head vails forward from the spinal column, which, missing its lower and lateral support, is stretched recumbent on the ground. At once, in this exchange of the erect for the recumbent posture, the fluids of the body recover their level, and the power of gravitation in the blood's current ceases to be one of resistance. There is, at the same time, a direct influence on the pulse and the breath, from the altered forces of the

thoracic and abdominal muscles employed on the elastic structures of the chest, and by the removal of lateral supporting pressure from the currents of returning blood. Moreover, through their nerves, effects necessarily result from the double muscles, sleeping or waking, to the large appended divisions of the brain and spinal marrow. Sleep is not passive, but functional; a task imperative, by alternation, in the voluntary muscle. Were it a state merely negative of contraction in the fibre, it could not successfully resist the spasm of chorea, or the strongest efforts of the unembarrassed will. We "fall asleep" by a distinct muscular act; and thus, are enabled again to wake. It is by a continual influence on the muscle,—by a something done in its fibre,—that sleep is prolonged.

Sleep in some of its relations with the muscle, is analogous to spasm, by which, in function, it is most opposed.

Sleep, like spasm, can be at once induced, by the introduction of certain principles to the blood. From the periodical development of a similar narcotic agency, as part of the regular business of the system, there is reason to believe that natural sleep ensues. Ordinary sleep of the voluntary muscles exactly resembles, and is probably identical with, the state induced in these structures by the temporary inhalation of carbonic acid gas. The elements of this compound vapour are, it will be remembered, always present in the extreme texture of every organ; and in the lungs, the gas itself is in a constant process of separation. Its periodical accumulation and diffusion

through the muscles by the blood would account for all the phenomena of sleep.

During the waking hours of labour and exercise, when in the voluntary muscles the waste of material is greatest, carbonic acid gas is formed in the largest quantity; for it holds, as a rule of nutrition, that most carbon is separated, where the blood is most used up. After a certain period of exertion, especially if prolonged in an erect posture, this narcotic vapour would seem to accumulate in the voluntary muscles, and there, for a time, to overpower the occasional functions of sense and locomotion. In the motionless repose of sleep, the carbonic acid is suffered, by the skin and in the lungs, in a literal sense, gently to fume away. Thus, by a periodical effect of excretion, the muscles, released from their thrall, are again fitted for their daily task of toil. In brief, let it be remembered, that sleep can be induced, at any time, by the agency of carbonic acid gas, which is always necessarily present in the blood and breath of every individual.

That the system may occasionally be narcotized by the fume of its own vapour, admits of frequent illustration by disease.

In cases of bronchitis, coma, with extreme stillness of the voluntary muscles, is a common result of interrupted excretion in the air passages. The same effects occasionally follow certain partial injuries of the brain, affecting the relations of the blood and breath, through the nerves and muscles of respiration.

MESMERISM AND MAGNETIC SLEEP.

It has been vainly imagined, that the influence under which the double muscles, by spasm or in sleep, are enabled to resist volition, may be made to proceed by an unseen magnetic agency from the organised structures of another individual. The muscle copies movements, as it originates them; and thus, while it follows the lead, may in some cases appear subject to the will of the bystander. By this relation of movement between two individuals, no new principle of action is implied in the animal composition of either. Intense pre-occupation of the attention, with great imitative aptness of the fibre, explain some few of the miracles of animal magnetism; knavery and collusion the large remainder. There is no authority but that of a man's own will, under which, his muscles can be made to act in consent with those of another individual. And this authority, it is needless to remark, may be exercised for the prevention of the expression of pain, as for the determination of positive movement in any part of the body. Yet, I have lately heard it assumed in public discussion, that because pain has not been expressed, it has not been felt. Nelson's own captain, the famous Hardy, (no longer a hero, if insensible to suffering,) was, on this occasion, exhibited to the profession as a physiological monster; and even common animal sensibility was denied to the integuments of a distinguished physician, who,

while under the knife, during the operation for strangulated hernia, preferred holding the candle in aid of the surgeon, to vain struggling, and noisy exclamation. Here, in the adjudication, by true physic, of its anomalies, mesmerism was less apocryphal than the counterplea of its more orthodox opponents.

Under the violent contractions of spasm, or while extending itself to the limits assigned to its fibre by sleep, we have seen reason to consider the voluntary muscle, not merely as a component part of the entire organized body, but rather as a distinct and independent animal growth, living and acting by its own laws; as a creature "sui generis," with an inherent power of movement, to which there is no parallel but in the spontaneous coagulation, and other vital actions of the blood.

In somnambulism, as in reverie, which it most resembles, we are equally impressed with the self-sufficient character of the fleshy structures, when considered severally in their organic function. Each of the double voluntary muscles seems capable, not only of originating its own states of physical action, but of exercising a separate faculty of memory and attention in reference to the carrying on of such action. Things are done, and done well, by the "sleepwalker," or by the abstracted student, of which he is not conscious while doing them, or at any time afterwards.

In ordinary sleep, as by special poisons acting through the blood, the voluntary muscles are submitted, collectively, and at once, to a common pervading

influence: and, under the same analogy, we may assume, that sleep, like poison, is sometimes determined partially in these structures, by a preference, in its effect, of certain muscles over others. The mysteries of somnambulism are thus best explained. It is a mixed state of sleeping and waking, expressed, thus variously, by different muscles, or by different fibres of the same muscle. Certainly, it is by a waking faculty, that the somnambulist "walks in his sleep;" for sleep and sustained action are incompatible, at the same time, in the same muscular fibres.

Sleep is a necessary periodical result, in the voluntary muscles, of their constant process of nutrition. In early youth, the function of sleep is of most importance, and is best performed; for the waste of the voluntary muscles is then greatest, and their nutrition most active. It is by a direct authority in these muscles, that the will indirectly exerts its influence for sleep. By exercise and chosen posture, the limbs are composed to slumber.

With certain states of the voluntary muscle, as with those induced by spasm, or in the delirium tremens resulting from an habitual excessive admixture of fermented liquors with the blood, sleep is incompatible. The extreme aptitude in certain persons to the influence of sleep, is in most cases associated with evident peculiarity of the muscular temperament. This double idiosyncracy has often been made the subject of humorous satire. It sometimes gives occasion to very serious inconvenience and distress.

A distinguished actor, whose name is greatest in

the annals of the British stage, was, for some years, habitually attacked by sudden fits of sleepiness, which he could scarcely control, even while actively engaged in the exercise of his art. The sting of a wasp, in an instance well authenticated to the writer, was followed by sleep, from which, heavy and protracted as that of opium, it was necessary forcibly to rouse the lady who was the subject of the case. She was a hale active person of advanced age, and had more than once been affected by the same poison in the same way.

The air of a heated room,—a mouthful of food,—or a pledge of wine, will, at times, induce sudden and unconquerable drowsiness in those who labour under this distressing liability. This habit of lethargy is attributed, in familiar language, to "derangement of stomach," and to "weakness of vessels." Under whatever remote contingencies of digestion or circulation it is produced, its effects are first made evident in the function of the voluntary muscle.

Generally, in illness, the symptoms which have reference to the business of sleep are much overlooked by the physician. Yet, as directly occupying the larger divisions of the body, this great muscular function should be most carefully remembered in the diagnosis of constitutional disease. Want of sleep is generally a consequence of constitutional disturbance; but it is often the cause of more than it is the consequence. In certain cases, it at once explains the symptoms, and resolves the treatment. The narcotic principle is here specific, and of itself suffices for the cure. One quarter of a grain of morphia has often prevented fever in its

origin, or stayed it in its course. Hysteria, by exhaustion, fast becoming typhoid, thus, in the muscles, as by a spell, is made to cease.

How full of wonder, how worthy of admiration is the drug, whose rule is sleep!

Medicine is, in its truth, God's mystery. Giving life, it is itself a gift; and comes to man, from heaven. If he acknowledges its use, he must believe in its purpose.

Sleep, like the other functions of the voluntary muscle, as age advances, undergoes a necessary change; and with them, by degrees, is found to fail. This is most observed at the period of life when habits of exercise are first renounced, and the exhaustion of youth ceases with its excitement. The middle-aged man is often, in this way, painfully surprised by a distress, which he would have anticipated on reflection. He becomes wakeful from causes, which, not understanding, though natural in themselves, he is ill content to bear.

Cases, the most difficult and anomalous, are often best questioned in the hours which, of right, belong to sleep. The sick man's night certifieth to his day; for in disease all is consecutive. How the patient rests, we cannot learn from himself alone. In fevers, the sufferer is scarcely competent to remember whether he has slept or not; and will often claim those nights as good, which he has passed in low and angry delirium. Again, the self-love of many invalids seems to suffer by acknowledgment of the act of sleep; and, accordingly, they deny the function altogether.

In this perplexity, the physician learns to appreciate the help which he receives from the well-trained and truth-telling nurse. Strange, that better security should not be taken for their ready and frequent association in the chambers of the sick.

In Protestant England, we trust too much to individual unassisted woman, for the practice of a difficult and laborious art. Though nursing be woman's mission, it is not with all an affair of nature and instinct. Few women are good nurses. Health and good-will are essential to the faculty, but are not all-sufficient. Good nursing is the economy of space, means, and time, in the sick chamber; with quickness of remark, and readiness of application.

It comes best from institution, and by education. In physic, all who minister, should be schooled. It is of direct interest to the physician, that those who tend the sick in the lone watches of the night, should be able to observe with judgment, and correctly to report, symptoms which would otherwise be lost in the history of the case. Physic suffers much in its evidence, from the incapacity of its witnesses, as from the vanity and bad faith of its agents.

It was with sincere pleasure, that the author, nearly three years back, received from a lady, then under his care, the announcement of an Institution of Protestant Sisters of Charity, for the purpose of nursing the sick. The idea of such an establishment had arisen in the mind of this sensible and amiable person, during the leisure of a protracted convalescence in the country. She had been nursed with care and tender-

ness by a sister, her partner in active business, while confined by sickness to her home in London; and thus was led to reflect on her condition as it would have been, had she suffered the same affliction, among strangers, in a lodging-house. Her thoughts were subsequently, by herself, arranged on paper, and directèd to a practical end, by a committee of ladies distinguished for their active and systematic benevolence.

One of these nurses has since been entrusted, under the author's eye, with the charge of a case of protracted suffering and difficulty, which ended well. The patient, a distinguished public character, expressed his sense of her services, by a liberal donation to the funds of the institution. That, when sick and hurt, we are still dependent on such chance nursing as our means afford; that there is no training-school for those who profess the discipline of illness, is not the reproach of the women of England, but of its male sectarians. In their exclusive polemical zeal, each for the supposed interest of his own establishment, they regard the opportunities of the sick-chamber with a separate purpose, and thus, with a common jealousy. Tending the sick is woman's special business, and to her, in its practical detail, it should be left.

DURATION OF SLEEP.

Early rising, excellent as a source of health, becomes, in its application, injurious, when made extreme. Sleep and exercise are pledged in the muscles of the young for a mutual succession of relief, under which, both suffer, if one be disturbed. In the regulation of this double function of the voluntary muscles, the physician's duty is much concerned. An additional hour's sleep in the morning is, in many cases, the prescription, by which strength and activity are best secured for the remainder of the day.

In cases of weak frame and peculiar muscular temperament, it is often necessary to enjoin the recumbent posture, at shorter intervals of time than every fourteen or sixteen hours. Many persons of all ages would be the better for lying down occasionally between their getting up and bed-time. The sleep of children should ever be respected as a vital function, essential to the development of their moral, as of their physical growth; and yet, in England, this rule, by instinct, of prudence and humanity, for mere purposes of individual gain, has been systematically reversed. The last hours of the night are bought from the factory children of Yorkshire and Lancashire in exchange for their day's meal; and they perish accordingly.

The health of the child-labourer is of necessity broken with his rest. Trade, which, in its balance, counts young lives, works ever to a loss. Its prosperity is Sin, that waits for Judgment.

LANGUOR.

The more violent symptoms of spasmodic disorder absorb much of the attention that is due from the physician to the muscle in its opposite state. There is, at times, in the experience of many, a distressing sense of inability to originate motion, distinct from actual weakness, and associated with full volition and entire soundness of the fleshy structures. This is Languor, in its medical sense; and a great deal of real illness is thus felt and expressed. There is a difficulty attending the use of this term in medicine, that, in its popular acceptation, it implies a state of mind and spirits, as well as of bodily health,—bearing with it a moral, rather than a physical meaning. Thus, we receive it from the patient, as an expression of general complaint, and seldom attempt to refer it to disorder in the function of any particular structure. In its most precise sense, to more of us it suggests only the phrase of a deficient "nervous energy;" under which, we connect it loosely and generally with the nervous structure; and here our enquiry ceases.

Once in the category of "nervous diseases," languor is associated exclusively with "nervous medicines," by the prescriber,—a great practical error, by which, symptoms of a negative character are often, through neglect, converted into an illness of positive suffering.

Languor, no doubt, is expressed by the nerves; but only as far as it operates on them through the blood,

or from the structures, of which they, the nerves, form a part.

To the sum of our general sensations, whether resulting in those of health or disease, the voluntary muscles greatly, and at all times, contribute. In them, as in other organized structures, the best evidence of healthy function is, that it is discharged insensibly, and without notice. Yet, like the blending of tinted rays into colourless light, this negative assurance of health, from the absence of sensation, is an effect, by combination, of positive and infinitely various notices from structure in all its parts. If these functional notices be faulty or deficient, the result, by general sensation, is one of prejudice and discomfort. And thus, from the impaired contractility of the muscular fibre, feelings of distress do frequently originate; which, in their expression, are universal through the system. For most of what is "nervous" by complaint, there is an authority, if questioned, in the flesh.

Languor should, in all cases, be considered in reference to the great business of the circulation, implying the volume and quantity of the blood, and the forces which sustain and regulate its current. It comes, occasionally, like a fever; by regular periods, and lasting only for a time; thus evidently determined by other influences, which are regular and periodical in the system. Occasionally, it introduces a paroxysm of fever, or is the principal symptom observed during the continuance of the febrile action.

Languor, in its marked form, is always associated with other evidence of impaired general function. Its

attack, in most cases, comes in sequel of profuse or interrupted glandular excretion; or is coincident with irregular development of the circulation and animal temperature. It is in close relation with the great business of digestion; and with the exercise of the generative function.

Languor is especially frequent in the early years of adult life; when, at this, the ripe age of bodily energy, habits of physical exertion are superseded by those of imagination and mental study. It is the scholar's great affliction; and is bred, with thought, beneath the brow that never sweats. Scarcely a morning passes, of which, in "chambers," or the counting-house, certain hours are not in this way rendered useless to their tenants. On the student lawyer, as on the imprisoned merchant, languor, irresistible as spasm, will often, and suddenly, steal; arresting every purpose,—chaining up the faculties as by a spell,—and bringing the further penalty of self-reproach for a supposed moral inefficiency, which is, in truth, the result of physical illness. Very much of real bodily suffering, of suffering which might, by remedial means, be lessened or removed, is thus hopelessly endured by those who are ashamed to complain.

Languor seems especially to affect persons, of what is termed an excitable and nervous temperament,—whose sense is fine in nature,—the thin rather than the fat, and the young more frequently than the aged. With those liable to this distressing influence, the exact moment of its commencement can often be determined, by peculiar feelings of disquiet and oppression; by a sense, as it were, of misgiving, referred to the

epigastrium. It generally makes its attack, late in the forenoon; and surprises the patient, as he walks, stands, or sits, by a lassitude, sudden and absolute in every muscle. His head becomes hot, heavy, and confused. He breathes with labour, and at long intervals. His pulse loses both rate and volume; the eyes lacking all lustre, seem to retire within the orbit; the cheeks grow wan and elongate, and there is congestion of the erectile tissues. Thus exactly timed, at its commencement, and gradually aggravating itself into a paroxysm, the attack of languor is often determined by a crisis of deep yawns and sighs, with much flatulent eructation, sometimes ending in sleep. These latter symptoms are accompanied by a flow of pale urine, with general moisture of the skin, and a copious secretion from the lacrymal gland.

Here, then, is a state of the voluntary muscle, as influenced, not merely in its relations with the nerve, but throughout its entire structure, by causes which are general in the system.

A fit of languor, it has been seen, resembles, in its symptoms, the effects that follow the introduction of certain poisons to the blood. Its influence, like that of opium, tobacco, or carbonic acid gas, is universal in the system; and like them, time given, it passes. Certain states of atmosphere induce a marked effect of languor in the voluntary muscles; influencing them, as it would seem, in their electrical and other functional relations with the blood. Thus, the approaching storm is felt in the limbs, before it flashes on the eye.

Hunger, in London, is for the most part expressed by Languor. The professional man, whose work it is, in large societies, to think for others, becomes languid, hot, and irritable, after a long day of talking and writing; and is thus reminded that he is in want of food.

Languor, in its most severe form, is sometimes associated with disordered action of the skin. It generally precedes an attack of urticaria, remaining with the rash until it subsides. A lady, whom I attended for this complaint in the autumn of last year, though of most cheerful temperament, was completely subdued in spirit and muscular power, on all occasions, previously to the appearance of the rash.

Languor that has been induced by a train of ideas, may be dispelled by a momentary emotion or a remembered thought; but it is not, therefore, the less sensibly felt, in its physical effect, on the muscular structure; for it is through the blood, and by the muscle, that the mind first expresses itself in the body.

Like spasm, languor does not admit of any one prescribed rule of treatment; but must be considered, in reference to all circumstances in the case of which it forms a part.

A fit of languor is often at once explained by the physical excess, or even by the moral excitement of the previous day.

——————— at illum
Languorem peperit cibus imperfectus, et hærens
Ardenti stomacho.

Languor, when periodical, is for the most part necessary, as a crisis of the previous disturbance, for the prevention of its own return. Like the paroxysm of fever, it admits of but little direct interference, while it lasts.

In the treatment of languor, with a view to its immediate relief, the worst means that can be employed are those in the most frequent use. By medicines of the class termed "nervous and stimulant," it is often aggravated into headache, oppressed breathing, and extreme general disquiet. Severe periodical languor is, in most cases, best encountered by measures that unload the vessels, and promote excretion from the skin and mucous surfaces.

Under the use of brisk aperients, the attacks of this disorder have in many instances been entirely baffled. It is the more necessary to insist on moderation in diet with those who are disposed to languor, as they are generally impressed with the idea of exhaustion by inanition. Thus, by the overtasked student, or indolent man of pleasure, as by the jade of fashion, a pretext is assumed for the indulgence of two or more meals of animal food in the twenty-four hours, when even one should in many cases be avoided.

Languor is best prevented by full regular exercise of the voluntary muscles; by temperance in food and sleep; by moderation in study; and especially, by avoiding all sensual excess, or undue moral excitement. Let us respect the rule. It bears the stamp of two thousand centuries.

——————— quin corpus onustum
Hesternis vitiis animum quoque prægravat unà,
Atque affigit humo divinæ particulam auræ.

TONICS.

Of certain medicines it is assumed, that their effect is determined specially in the muscular fibre, by the increased vigour and sustained energy of its contractions.

Like all that relates to muscles in medicine, the conventional phrase of "tonics" wants precision, and is of uncertain use. The medicines classed under this designation, are, for the most part, suggested by a loose and fanciful analogy of their agency, as supposed within, or observed externally to the living body.

Iron was ever the type of strength,—man's armour against man. Yet, by the well-tanned hide, even iron is repelled in the life assault. Thus, bark and steel were, as tonics, first preferred. Their use began from a metaphor; and in prescription, is too often calculated in the direct ratio of their quantity. There is, in truth, no class of medicines directly and exclusively "tonic" in their operation on the living muscle. Whatever conduces to the improvement of the general health, necessarily accords with the muscular function; and thus, under circumstances, all remedial means are indirectly tonic; jalap and venesection, not less so than steel, wine, or peruvian bark.

Between the class of medicines known as "vegetable bitters," and the fibre of the voluntary muscle, a special relation, by tonic agency, is generally supposed to exist. That, under the use of these remedies,

the appetite occasionally improves, is a received truth. It is not so certain, that, by a course of bitters, strength is ever directly added to the muscles. There is here very interesting matter of experiment for the animal chemist, as to the nature and range of the influence exercised by the bitter principle upon the contractile energy of the fleshy fibre. Certainly, the greatest possible amount of muscular contraction may be determined in the voluntary muscles, by very small doses of a substance the most intensely bitter that is known in nature. A grain of strychnia kills, by tetanic spasm, the man who swallows it. Dissolved in six thousand times its weight of water, the same quantity of this alkaloid salt is still bitter to the taste.

Tonics are but alteratives under another name; and should be administered with the same nice regard to the peculiar character of the case. He who orders them, takes on himself a serious responsibility; for when they act in the fibre, it is by previous influence on the blood. Let no physician lightly exercise his privilege of adding, by prescription, metallic salts and concentrated bitters to the circulation of persons already weak in health.

There is no metal which is not a poison, in accumulated doses; and the most deadly of vegetable principles, it has been said, are those which are the most intensely bitter.

Headache and palpitation are among the common effects of a careless perseverance in a course of tonic medicines. Apoplexy and severe local inflammations have often been the further result.

Great exception is occasionally taken, and with reason, by patients, to the medicines prescribed for them under the designation of tonic. With some, from the lavish carelessness of their administration, they have been found, on former occasions, to disagree. Others, and the true physician should in this matter, as in all others, carefully protect the interests of those under his care, are ill prepared to meet the expense which a course of these medicines necessarily implies. They are seldom needed, and are often directly injurious.

PALSY.

To the physician, as by the surgeon, palsy of the muscle is known especially, by lesion of the nerve. It is not in our present design to insist on the numerous relations established, by this disease, between the double muscles and their corresponding divisions of the central nervous structure. They are under daily observation, yet do not lose their interest by their frequency; having been, like all that is common, neglected in detail. Most palsies, it is well known, proceed from the head to the limbs. Indeed, it is by the pathology of hemiplegia that we learn the central functions of the brain, and distinguish them in the muscle.

And here, in remarking on palsy in its ordinary character of partial and limited effects on the muscle, we cannot refuse the correction which it affords to the prevailing doctrine of "nervous sympathy." Claims have been advanced, of late years, for the nerve, as the exclusive agent of all influences that are universal and simultaneous through the body. Indeed, the term "nervous," in the language of modern medicine, is synonymous with whatever is general and sudden in the system. Yet, in every case of hemiplegia, there is an exception, and a large one, of the muscle, from influence by the nerve. It is established by repeated dissections, that one half of the brain is not necessarily sentient of damage inflicted on the other; and that no

sensible effects follow, by continuity of nervous structure, from disease of the spinal marrow, in the upward direction of the column. It may be generally observed, that a much greater effect of muscular disturbance is induced by irritation of the nerves, where organized in their extremities with other structures, (as in the skin,) than from the destruction of their substance in the central unions of brain and spinal marrow. And, in this way, by effects of impression on the nerves in their remote and separate organization, the contractile function of the fleshy fibre may be entirely suspended, as it may be suddenly produced. Palsy, like spasm, may be determined to the muscles from the skin. Poison and the air-blast, by partial contact with the face and limbs, have often thus prevailed. This distinction of cerebral hemiplegia from palsy reflected by the nerve, is one of nice practical importance, and often involves the question of directly opposite methods of treatment. It has only of late years, obtained generally among physicians. In a consultation held by the writer, many years ago, with the late Baron Dupuytren, that eminent surgeon abruptly refused the suggestion, that facial paralysis could be occasioned by the direct agency of cold upon the cheeks. Our patient was a Scotch physician, then on his way to Naples, who had been exposed for some hours, while asleep, to a bleak current of air from the open window of the carriage in which he travelled. On proceeding to shave himself, shortly after his arrival by mail in London from Edinburgh, he was startled by the reflection of a hemiplegic coun-

tenance in the mirror. There had been no previous symptoms of disturbed health, either local or general. When he reached Paris, I scarcely recognised my old friend from the strange distortion of his features. Cupping, blistering, and purging, with low diet, and two setons in the nape of the neck, were prescribed for him by M. Dupuytren, to whom the circumstances of the case were fully explained. These directions I would not suffer him to follow, and, after some time, he proceeded to Italy in charge of a distinguished English family, having regained much power by volition over the paralysed muscles.

This interesting case has, I believe, been noticed by Sir Charles Bell, in one of his numerous memoirs on the nerves. And thus, from within, as from without, the muscle may be rendered motionless, by a prejudice to the nerve, not implying of necessity the disorganization of its structure. These functional palsies, in most instances, depend on the nerve, only as far as it is influenced, through the circulation, by what is faulty or defective in the blood. Congestion, or anæmia of the nerve, alike prevent its contractile energies in the muscle.

Palsy is never more complete, than when its source is bloodless in the brain; for, from the brain, as in the fibre, the motive influences of the nerve are, by the blood, made current through the muscle. Indeed, the immediate cause of the paralytic seizure, in ordinary cases, is the sudden compression of certain vessels in the brain, consequent on the sudden emptying of others. Thus, while in the seat of injury, the

blood-current escapes to waste, it is entirely prevented in the parts beyond.

But, it has been further said, that, with no local effect of disease or accident, the brain may, from faulty relations with the blood, be rendered powerless in the muscle.

In the case of a young gentleman, who died under my care, in 1833, with symptoms of stertorous apoplexy, there was neither congestion within or effusion without the brain, which, though complete in all its divisions, and sound in its structure, was, from the entire absence of blood, blanched throughout, like wax. Extreme pallor of the countenance had been remarked in this case, long before the last fatal symptoms; yet, from the urgency of the apoplectic seizure, large quantities of blood were taken from the arm and by cupping, by those who were first in attendance on the patient. In both kidneys, the cortical structure had nearly disappeared, by a gradual dwindling away of their substance. An account of the case, with others, was laid before the College of Physicians, in illustration of the head symptoms induced, through the blood, in a sound brain, by this form of renal disease.

The caution, inculcated by these effects of cerebral anæmia, against the practice of indiscriminate bleeding in all cases of paralytic seizure, again presents itself, in our treatment of the muscular symptoms resulting from the presence of certain adventitious principles in the blood. By the subtle energy of opium, or of alkohol, the function of the double voluntary muscles may, through their nerves, be as

completely suppressed in the brain, as by the mechanical states of congestion or effusion in its substance.

The unsteady step and inarticulate utterance of intoxication are a temporary palsy of the tongue and limbs, and the earth-bound stupor of profound drunkenness is apoplexy, while it lasts. To the physician there is a lesson of practical medicine in the progressive symptoms of a drunken debauch. He learns from it how much the brain may suffer of hurry and general disturbance in its circulation, with no necessary result of prejudice to its structure. In this branch of experimental physiology, our forefathers of England have been the world's great instructors,—the squires and centurions of the good old time,—who lashed their men and caged their boors for indulgence of the vice, of which, at their mess-tables and in their own halls, they were the constant and crowning examples. It is not from want of organic cohesiveness in the structure of the brain, or from effusion on its surface, that motion ceases in the muscles of the drunkard who perishes slowly by the effect of chronic disease, or suddenly expires at his post of disgrace. In all such cases, life is prejudiced throughout the fibre, in the elements of its material structure, and at the very source of its circulation. He who drinks himself to death, begins, by killing his own blood.

In certain muscles, as in other organized dynasties, the excessive use of power is sometimes followed by its loss. Thus, it is well known, the hands of the

over-tasked mechanic may hang in paraplegic idleness by his side, with no corresponding lesion of the nervous column, or prejudice to the blood in circulation through the limb. I have met with instances, in my hospital practice, of a similar affection in stablemen, in washerwomen, and, once, in a farm labourer, who had been constantly employed in thrashing with the flail. Long disuse of the muscular fibre may, on the other hand, seriously impair, if not entirely abrogate, its function of contractility. In sequel of most cases of cerebral hemiplegia, there is a long superadded palsy of this kind, preventing in the affected muscles the vindication of their function from the effects of the original disease.

At this present time, it is more especially necessary to remember, that palsy of the muscle does not always originate from central injury or congestion of its nerve. Instances are not unfrequent, in these days of pauperism and starvation, of persons dropping suddenly by the wayside, helpless and inarticulate, from sheer inanition of the muscular fibre.

TREATMENT OF PALSY.

The treatment of hemiplegia is, for the most part, retrospective,—an employment of means, for the repair of a supposed local mischief, rather than a prevention, by improvement of the general health, of the constitutional causes on which such mischief may have depended. Congestion, effusion, and inflammation, are the terms of caution, which prevail almost exclusively with the modern physician, for the regulation of his practice in this disease. Continually apprehending a relapse by cerebral symptoms, he becomes unduly afraid of action, in all its varieties, and in every degree. Yet, by action, general and local, and by action only, can the recovery of his patient be completed.

Cerebral hemiplegia, we have seen, is not a mere result of impetus or obstruction in the mechanism of the circulation. Of physical strength to resist the blood-current there is but little, at the best, in the brain. Its security against hemorrhage is the healthy nutrition of its own texture.

In the after treatment of palsy proceeding from lesion of the central nervous columns, we occupy ourselves, for the most part, much too exclusively with the presumed structural alteration of the brain or spinal marrow; another great practical error in modern pathological medicine, which insists, in every case, on dissecting the patient alive, and makes selection of remedial means, according to the dead

and damaged parts of the affected organ, rather than by reference to what remains of its living organic function. After partial injury by pressure or effusion, the brain, if let alone, is thoroughly competent to the repair of its own flaws. Persons in this way hemiplegic, do not, in an average number of cases, bear epidemic general illness worse than their neighbours.

An elderly man, of large make and full habit, while under my care in the autumn of 1842, for inveterate palsy of his left side in sequel of apoplectic seizure, was attacked by gout, with violent angry fever, yet expressed himself throughout, as in no way suffering from his original head symptoms.

In the ordinary treatment of palsy, as in its pathology, there is an exclusive reference to the nerve, often preventing a sufficient consideration of the means best calculated for the improvement of the general health. It is endeavoured, by repeated venesection, and by the specific agencies of medicine, to prevent further effusion, and to promote absorption in the damaged structure of the brain; while the great common nutritive functions of the body, on which all local action is known to depend, are scarcely considered in the scheme of remedial means. Indeed, the general powers of the constitution may be often observed to break up and fail, under these measures of rash and violent interference with the local business of repair, in the after treatment of muscular paralysis. Mercury has thus marred the recovery of thousands, in the routine practice of the regular allopathist. How

presumptuous is modern pathological medicine, which affects to pre-arrange in structure the very process of nutrition!

It is time that these mischievous absurdities should be denounced by those, who have most reason to lament them.

In human affairs, Physic is, for the present, an anomaly. Man, shrewd, free, and inquiring in all else that regards his personal advantage, will not much longer surrender his intellect to the dull mysteries and empty pretensions of an "improved medical science," or consent, by his feelings, to the reckless cruelty of their practical exposition. Palsy of the muscles, unless when following immediately on external injury, always implies a state of previous disorder in the health; which, after the invasion of the symptoms, may still continue to exist, and should, in the treatment of each case, be carefully and specially considered. The causes of hemiplegia are many and various; mechanical it may be, or progressive in their action;—local in the limb, or general in the constitution. By preventing their recurrence, as by redressing their effect, we enable the paralysed muscle again to find its contractility, in the healthy process of its own nutrition. And here it will be remembered, that the muscle, by one of its parts, is organized in the brain, and there subjected, as in its fibre, to all influences, whether of damage or repair, that affect the common business of growth. Thus it is, by a fresh inosculation, of its nerve with a sounder portion of the brain, that in the sequel of cerebral hemi-

plegia, the muscle at length recovers, by a renewal of its structure, the completeness of its function. In furtherance of the cure, by self-movement, in the muscle, a careful revision of the patient's general health is, as a rule of treatment, of strict and constant necessity. Palsy, in all its chronic varieties, requires from the physician, if not most of his energy, yet much of his discrimination. His means, in such cases, are the more worthy of his art, as they are not direct, but reflective and contingent.

In the protracted convalescence of this disease, the recovery of power in the paralysed limbs is best secured by the healthy nutrition and due exercise of the muscles, whose function has not been disturbed. Strong efforts of the will should, in such cases, be determined to the structures which are again beginning to acknowledge its legitimate right of control. Herein, the patient must of necessity minister to himself; for, in his separate will, one positive element of muscular power is placed entirely at his own disposal. Volition, it is found, will often obviate, in the contractile functions of the muscle, the effect of a supposed physical disability in its nerve. Scott, the great Walter, while yet a child, thus cured himself of lameness. Stretched on a shepherd's plaid, among the heather of his native hills, he soon recovered, by his own eager will, the command of muscles which had been palsied by the fever of dentition. From medicine, in this case, whether local or general in its means of application, by the little sufferer nothing had been gained.

WEAKNESS OF THE SPINAL MUSCLES.

The pathological importance of muscular agency receives its full illustration in the symptoms and treatment of spinal disease. The cure of a crooked back may be often effected by the healthy exercise of its own muscles. My late father, ingenuous and humane in all his proceedings, never failed to enforce this simple anatomical truth, by instruction, as in practice. Many young growing girls (now, it may be, the handsome mothers of healthy families) were by him raised from the horizontal boards, or released from the casing irons to which, from mere weakness of fibre, and with no just cause of vertebral disease, they had been by others condemned. Placing a light weight on their heads, and desiring them to poise it as they walked, he thus practically taught the equilibrium of the spinal column by the tonic power of its double supporting muscles. The one model that he exhibited for imitation to his young clients of fashion, was the Irish basket-woman, head-laden, yet erect, on her way to market from the garden.

PALSY OF THE TRUNK AND LOWER LIMBS.

Distinguished in their use, as the principal organs of locomotion, and by the support which they afford to the body in its human posture erect, the muscles of the lower extremities are liable to much peculiar disturbance of their function, by agencies from without, as from influences within the system. Instances are not unfrequent, in the observation of social life, of persons who, though always encountered in crowded company, are never seen but in the sitting posture. These are the subjects of chronic paraplegia. Cold, damp, and weariness settle principally in the lower limbs; to which, by spasm and paralysis, many poisons of the blood appear to be specially determined. Cholera, if severe, is seldom unattended by cramp of the legs; and paraplegia of parts below the pelvis is often a result of causes, which, while acting on the general health, are not incompatible with sound organization of the central nervous columns. The paraplegia incidental from the brain and spinal marrow to the lower limbs, like other diseases of the cerebral system, is observed sometimes in a succession hereditary from parent to child. The causes that induce paraplegia of the lower extremities through their effect on the general health, have reference, for the most part, to the exercise of the generative function. Excess in this respect is invariably followed by exhaustion of the muscular power, remarkable through-

out the system, but especially so in the fleshy structures of the thighs and loins.

Young men are not unfrequently crippled from this lamentable cause, preventing the contractility of the muscle by a prejudice of its constant business of nutrition. Too little thought is given by the physician to the reciprocal influences of the generative with the other functions of the body in the explanation and treatment of disease. Digestion,—breathing,—the circulation,—and muscular contractility,—are in the closest and most constant relation with the procreative energies of man's constitution, during the greatest period of his life. There is no limit to the practical application of this principle in cases of individual temperament. The subject is one which should be boldly and widely considered in the entire range of its possible influence on the health of all concerned. It is a duty which belongs of right to the physician, and, if refused by him, devolves on no one else. If, from mistaken feelings of delicacy, he habitually declines the inquiry, he foregoes one of his assigned and special privileges of doing good, and of bringing comfort to those who are most in need of his help.

Missing the counsel, to which he is entitled, of the most indulgent friend to humanity in all its errors, the sufferer, against his better judgment, becomes the client of pretenders the most merciless and depraved.

If such be the province of the physician, can too much security be taken from him, by general education and character, that he shall discharge his trust

with truth, kindness, and delicacy? Can his intercourse with mankind be too extensive, or his habits too refined? Are not the public directly interested in maintaining, by the highest standard of manner and attainments, a due consideration for those, who, if approved as medical counsellors, must at times be suffered as moral censors?

PARAPLEGIA FROM HYPERTROPHY OF THE CRANIUM.

In the most protracted case of paraplegia that ever fell under the writer's care, it was found, after death, that the symptoms had depended on hypertrophy of the bones of the cranium. The progress of disease in the osseous structure was expressed almost entirely by a gradual failing of power in the voluntary muscles.

Both legs were for many years completely paralysed,—the arms subsequently lost their use,—and death at last ensued, from interruption of the muscular functions of breathing and deglutition. The severe and sudden headache, which had marked the beginning of the case, ceased soon after the paralysis commenced in the limbs. There was complete blindness, by amaurosis, of both eyes; yet, the faculty of hearing was altogether unimpaired. Thought, memory, and judgment, remained with the excellent person thus afflicted, to the last. Entirely dependent on others, she was most delicate in the exaction of their services, and valued them with the nicest regard. On her

death-bed of many years, motionless and almost without physical sensation, she was lively in her faith, and cheerful in her submission. Still, in her dull closed brain, remained, with life, the soul's true wisdom. From symptoms what a lesson! Of mankind, by man, the physician is assuredly the best instructed.

In this memorable case, the muscles were, through the gradual and uniform thickening of the bones of the skull, compressed, as by a vice, in the double bunch of nerves, by which they are tied together in the brain. This is the third instance of which I have record in my practice, of paraplegia depending on hypertrophy of the cranium, with no coincident disease of the brain or spinal marrow. In the other two cases, which are registered under the dates of February, 1833, and January, 1834, both the patients were men beyond the age of forty, and of muscular make. One of them, in whose family insanity had prevailed, died comatose; the other, whose health for the most part was apparently good, sank exhausted with sloughing sores of the back and hips. In all these cases, the osseous hypertrophy had been general over the skull, which in some places measured nearly half an inch in thickness. No traces of diploe were observed on the divided surface of the cranial bones, which were exceedingly heavy, and hard as ivory.

In a case which I attended with the late Mr. Farquhar, of Cadogan Place, in the years 1837-38, the cause of certain remarkable symptoms was first ascertained by examination after death, in a general morbid thickness of the bones of the skull. The

patient, an unmarried lady of middle age, though never without the command of her limbs, had been long bed-ridden, from weakness and disinclination to move. Coincidently with this state of the muscular fibre, there was a great aggravation of sensibility throughout the body. The sense of smell was painfully acute, and even a footfall crossing the room became to the ear an occasion of distress. Every ray of light was carefully excluded; so that the physician was compelled literally to feel his way to the bedside. Conversation was suffered only in a whisper, and the tongue was examined by the light projected on it, from a small lantern, by the attendant. During repeated visits to this lady, I never once had the opportunity of becoming acquainted with her features.

Occasionally in chronic paraplegia, the will, by a limited effort, does for a time prevail, in parts from which its ordinary authority has long been removed.

A gentleman, well known to the writer, who has been for many years paraplegic in his lower limbs, is still able to find his way, unattended, along the public streets; but always with a shuffling step, and at a running pace. His progress continues, thus rapid and direct, until arrested by a rude encounter with projecting objects, or by the stay of a stout stick, which he carries for the purpose.

SPASM IN PALSIED LIMBS.

In paraplegia, the affected limbs often suffer strange interruptions, by involuntary spasmodic movement, of their habitual powerless repose. Muscles which have long refused even a momentary obedience, by contraction, to the will, strive with pain and violence against the desire to rest; and the patient's body, it may be, is, in self-defiance, projected from the couch on which he lies.

A very remarkable case, illustrative of these anomalies in the muscular function, was laid by Dr. Webster before the Medical and Chirurgical Society, on November 8, 1842. By disorganization of the lower cervical portion of the spinal marrow, there was complete paralysis of all parts beneath the neck; yet the arms and legs of both sides were frequently and violently convulsed. In contravention of the received "nervous" theory, sensation over the entire surface of the body was not only unimpaired, but rendered morbidly acute.

Here, in this important case, it is at once seen, how little the nervous relations of the muscle are at present understood.

Sensation and motion have been localised, with anatomical exactness, each in its own column of the spinal marrow, and thence have been made as from a source to flow to the structures in which by function they are expressed. These conclusions are not strictly

verified in the experimental physiology of disease, and must now be reconsidered. Our enquiries respecting nervous disorder of the muscular, as of all other functions, suffer much undue limitation, from our habit of submission to the convenience of the anatomist. By him, the nervous influence is too much centralized. His demonstration of the nerves necessarily begins from the head and spine; and there, by the combination of nervous structure, he infers the origin of all nervous action. The only true classification of the nerves, as functional agents of health or in disease, is obtained, not by ingenious sections of the brain and spinal marrow, but, at once, from the organs of which they form a part, and whose various offices they severally represent.

PALSY OF THE LEGS.

Even under the hemiplegic seizure proceeding to the extremities directly from the brain, there is matter for separate observation and study in the symptoms exhibited by the muscles of the lower affected limb. Of locomotive structures, the leg, though sometimes in palsy the first to fail, almost invariably takes precedence of the arm in recovery of the contractile function. Common though it be, this is one of the most important truths in pathology. From it, there is a ready inference, that, by a separate organization in the spinal marrow, the corresponding muscular nerves of the lower body, are enabled more readily to recover from the effect of any prejudice which they may have sustained in the brain. Or it may be, that in the structures by which man stands erect, and moves from place to place, searching for his food and seeking his mate, the nerve, as in the vital viscera, does for its own function partly of itself suffice, and is, from the beginning, less dependent upon the central influences of the brain and spinal marrow. The fœtus, we have ever been led to believe, leaps and kicks within its mother's womb. In this uterine movement, the upper extremities are not supposed to participate. Under any conjecture that can be offered, it remains as an anomaly in our present theory of the nervous system, that a motive power should be acknowledged from the will in the muscles of the lower limbs, which

is refused by those of the arm, after organic injury of the brain, common, in their central union, to the nerves of both.

TREATMENT OF PARAPLEGIA.

It is by studying the muscle in its wide and constant relations with all structure through the blood, that we best learn to distinguish the constitutional varieties of paraplegia, and are sometimes enabled to cure them. By reducing the quantity of material in circulation through the vessels, or by supplying it,—by active purging, as by arresting excretion from the bowels,—according to the circumstances under which the nutritive function of the muscles has been impaired, the physician does at times literally succeed in setting patients again on their legs, who, under the imputation of spinal disease, would be condemned as incurable. In some cases, this end is effected by the introduction of certain alterative principles to the blood, thus influencing, by insensible degrees, the entire muscle in its extreme texture and process of growth.

Of late years, strychnia has been proposed by certain practitioners as a remedy in this disease, on the principle, it would seem, of curing palsy by inducing tetanus. There is no warrant, by experiment or analogy, for the medical prescription in such cases, of a poison which kills by spasm, yet is powerless

in the fibre for its healthy contraction. The partial irregular movements, that occasionally succeed the use of the alkaloid salt of the nux vomica in the muscles of the affected limbs, have been followed, in many unrecorded instances, by convulsions of the entire frame, with interrupted breathing, closed in the stiffness of death. These observations apply with the necessary limitations, to veratria, and to all other poisons of the tetanic class.

I have only twice exercised my physician's privilege of experimenting with strychnia on living human beings. In the first instance, when resident in Paris nearly twenty years ago, I prescribed minute doses of the alkoholic extract of nux vomica to an old British Admiral, impatient of a slight hemiplegic weakness in certain muscles of his arm and face. Of this empirical practice I was soon made ashamed, by a complaint, from the patient, of strange uneasy sensations in his head, with twitchings in various parts of his body. No harm ensued; but the hemiplegic symptoms were not relieved. I never again used strychnia as a medicine, until recently, in the summer of 1842, when I prescribed it in doses of the sixteenth part of a grain, to be taken night and morning, in the case of a young man under my care in St. George's Hospital, for paraplegia of the lower extremities. Certainly, after a few measures of the poison, this patient expressed himself as "considerably better," with a feeling of more command over the paralysed limbs, which were frequently disturbed by an involuntary jumping.

But the improvement, if any, was not sustained. He left the hospital soon afterwards, completely paraplegic, and despairing of further relief.

Whatever power of volition remained in this man's legs and lower body, was necessarily developed by the numerous enquiries to which he was subjected, respecting the local effects of the alkaloid salt; and, by this contingent impulse to the fibre, the slight increase of its contractile energy may be in part explained. Severe nocturnal headache, interrupting sleep, three or four hours after the strychnia pill had been taken, was a frequent symptom in the case. This never happened on nights when the pill was omitted.

As facts in experimental physiology, these contrived spasms of the voluntary muscle are of great and undoubted interest. Proclaimed and published by the practising case-monger, they are turned by him to practical and profitable account. To the physician they are of no avail. For him, it is not enough that the muscle be made to move, unless in harmony with others, and by the will's consent. In the treatment of muscular palsy, his means of prescription are warranted only to this end. His test of recovery is the use of the limb.

Medicines of the diuretic class, in every variety, mild or acrid in their operation, have been much used in the treatment of paraplegia; sometimes, with apparent benefit. Of turpentine, the writer has made

very extensive trials in muscular weakness of the lower extremities, and he finds himself still relying on it occasionally in prescription. Its virtues, however, have been unduly exaggerated. In all such cases, let it be remembered, as a general caution, that it is unsafe to tamper with the function of the kidney or with that of the other great organs of excretion; as palsy of the muscles is frequently, through depravation of the blood, associated with established glandular disease.

Here is an objection to the general practice of blistering in the treatment of chronic paraplegia, that, by inducing strangury, it may aggravate the symptoms; yet, by this, as by other remedies of local application, we may occasionally be much assisted in our encounter with cases of muscular palsy.

Assuredly, great effects of movement may be determined to the muscles from the skin. Persons, narcotized by opium, have been made to recover the command of their limbs and breath by dint of pinching and the scourge, when other means have failed; and it is the midwife's frequent triumph to whip the newly-born infant from asphyxia into life. Friction, electricity, and the douche, hot or cold, are thus made conducive, from the outer loins, to a recovery of the muscular function in the parts beneath.

It is not merely through the nerves, and by sensible impression, that the muscles are influenced from the skin; but still more widely and constantly by

effects on the organic functions and composition of the blood there expanded. The skin, it should be remembered, in reference to the muscle, is employed unremittingly on the elaboration of the common material of all structure, and is often vicarious in its operations with the kidney, lungs, and stomach. Much of atmospheric influence is in this way transmitted to the system; and it is thus, by effects on the blood, that, in the bath, the muscle relaxes, or is braced. When, after an extensive injury of the skin, the sufferer sinks and dies, it is not from irritation of the cuticular nerves, but from the circulation of damaged blood through its fibre, that action ceases in the muscle. Thus the burn and the scald destroy. To the flame that chars the skin, the blood mounts, and is killed. Remaining in the structures, it is matter extraneous, and a poison, interrupting their functions, and no longer supplying the material of their growth. Loose fibrin is dropped in the interstices of the lung; the continuity of the great tubular structures of digestion and assimilation is breached by ulcers; serum drowns the brain, and the muscles are stiffened by spasm unto death.

It is through the joint agency of blood and nerves, that the muscles are roused to action by the electrical spark, and under the process of shampooing. By the healthy functions of the skin, the growth of the fleshy fibre is maintained, and its contractions invigorated. Weakness and lassitude of the locomotive structures are generally associated with disease of the outer surface of the body. These healthy rela-

tions between the skin and the fleshy fibre were practically understood by those who did the work of the world two thousand years ago. The day-labourer of Greece and Rome was enabled, in part, to earn his wages, by constant use of the bath, with habitual friction of his limbs. In caring for his skin, he prevented the failure of his muscles. And so would it be in England, were we clad in woollen. Sore labour here enjoys no bath; yet, in respect of personal cleanliness, this, our exception from the customs of the antique world, is not so great as may at first appear. Every man, with a change of linen, bathes, on washing days, in his laundry. Strange, that in this country the bath should not be more considered among the means of health, and as a source of healthy enjoyment! It is time, with the improvement of their lesser morals, that the Commons of England should be taught and encouraged to be clean. They have cheap music, free gardens, and literature at prime cost. The capitalist who would give them baths, might realize, on a small individual profit from the million, a large portion of what is now expended on the filthy luxuries of gin and tobacco. It is to be hoped, that vast constructions by steam and water-course, will, within the present century, achieve, by a London Refuge-Bath, a further triumph for the engineer of the tunnel and the railway. How much these opportunities for ablution of the entire person are needed by all classes of our city population, the medical observer alone can know. In schools and colleges, with all else that, by the development of the

muscular energies, promotes activity of character with cheerfulness of temper, the bath, as a rule of discipline, should be strictly enjoined.

BATHS AND MINERAL WATERS.

Under the principles that have been assumed in the general treatment of muscular disorder, there is a frequent indication for the use of certain of the natural baths and mineral waters in cases of chronic palsy and paraplegia. And by experience, this contingent rule of practice is largely confirmed. Every allowance made for the effects of imagination, thousands have undoubtedly recovered their locomotive powers at the springs of Bath, Buxton, and the Badens, who, by other means, would have been still deprived of this choicest privilege of animal life. And, if by imagination, still by physical agencies thus developed and incidental to the muscles. For imagination, that rules the world by ruling men, rules in the man by pulse and breath.

In their application to medicine, the chemicals of nature's laboratory suffer by disparagement, as from undue praise. Yet of their frequent efficacy as tonic alteratives, it would be idle to doubt. The effects that occasionally follow the use of certain mineral waters in cases of muscular disorder, are exactly those which the physician is most ready to acknowledge in sequel of his own prescription. Air, exercise, and diet, to many of these cures, altogether, or in

part conspire. Still, an approved belief remains, of virtues specific in the spring. It is, we may reasonably suppose, by an improvement of the common material and general function of nutrition, rather than by a special determination of particles, chalybeate, sulphureous, or saline, to the palsied fibre, that, from the bath or beaker, contractility is again made present in the muscle.

EXERCISE.

The advantages, resulting generally to the system, from the healthy condition and due exercise of the voluntary muscles, are very commonly overlooked in the direct and manifold uses of their locomotive and mechanical agency. It is, therefore, the more necessary, that by the physician these structures should at all times be considered, in their wide and constant relations of function with the other organized divisions of the body. On the muscle, living and growing, both blood and nerve depend; for by the muscle most blood is used, and from it most nerves proceed. It is not only by the mechanical aid of lateral pressure in supporting the larger venous currents, or as the principal motive organs of breathing and digestion, that the voluntary muscles influence the great business of the circulation; but by a continual elaboration of the blood itself in the process of their own assimilation.

The healthy nutrition of every structure is best promoted by the due and regular discharge of its peculiar organic function; and thus, from habits of activity in the muscle, a corresponding advantage is obtained in the composition of the blood.

In early youth, exercise is most needed, for growth is then most active; and by exercise the blood is best fitted for the business of nutrition. Our health, (and here a great moral responsibility is involved,) is

placed very much at our own disposal, by the power with which we are entrusted over the voluntary muscles. It rests principally with ourselves, in the use which we make of these structures, whether our blood shall be quick and fresh, or stagnate idly in our veins; whether our nerves shall be apt, or dull.

In the education of both sexes, this principle of self-reliance should be carefully inculcated, and continually enforced. Persons habitually indolent, yet willing to reflect, should be made to understand, that, in not exercising their limbs, they prevent in part the discharge of a common vital function; which, if refused by the voluntary muscles, necessarily devolves in a greater degree on structures which are incapable of rest, and which are never protected by the will. Observing the vast exertion, of which the muscles are capable, with positive advantage to the general health, as instanced in the records of travel and the campaign, it is matter of wonder, that man can forego the exercise of his limbs, with even temporary impunity.

A short, heavy, middle-aged man of business, who had several times been under the writer's care, for rheumatic pains, headache, giddiness, and asthmatic breathing, was compelled, by the pressure of sudden difficulties, to travel on foot, in another interest, for orders in the articles, which, for many years, he had manufactured on his own account. Thus engaged, he walks from fourteen to sixteen miles in the day; and, now first enjoying health, is well content to have improved, by his pecuniary distresses,

the real value of his existence. In the healthy active function of the voluntary muscles, all previous disorder of head, joints, and chest has found its complete and natural cure.

It is not enough, in most cases, that the physician should counsel exercise to his patient; while enforcing the principle, he must suggest the means and the variety. To the young athlete, languishing in cities, the "constitutional walk" will not suffice. It is not the season for shooting, boating, or cricketing; and the Income-Tax prevents a horse. Fencing in the school, smartly and by the hour, will secure all the relief that exercise, by free action of the skin, can afford to the circulation. Many fine young men are enabled to avert illness and keep themselves in condition, during their London life, by regular attendance at Angelo's rooms, who would droop hopelessly under the pharmaceutical directions of the mere prescribing physician.

When the health of the English gentleman suffers from want of work, the one prescription, which he never fears to follow, is "Mount and ride." To those who have been bred on horseback, there is no substitute for the saddle.

Exercise of the voluntary muscles is essential to the completion and maintenance of the general health. In some habits, this rule is of more urgent and frequent necessity than in others. There is a wide range of difference in the muscular temperament of different individuals, which, when true and approved, should be indulgently considered in the facilities for

exercise, and in the allotment of task-work under the regulations of school or prison discipline.

Certain persons never stir, if they can help it. Others are impatient of a moment's rest. This natural slowness or restlessness of fibre is characteristic of families and entire nations as of individual persons, and may be inherited, with all else that is elementary in action, by a run of ages, through the blood. To the blood, in its variety of composition, these peculiarities of muscular temperament, are in truth to be referred; rather than to differences of conformation in the brain. In medical ethics, there is more warrant for hæmatology than for craniology.

And not only man's physical health, but many of the higher attributes of his nature are, through these structures, placed at his own disposal, and made dependent on his will. In the due exercise and management of the voluntary muscles, much of our moral duty is made to consist. Work, life's great practical moral, in them, for good or for harm, is mainly carried out. The human purpose is by them made complete; and virtue thus becomes example. Had Æneas been feeble in the shoulders, his filial piety would not have been the pattern theme of posterity; and Grace Darling, less practised with the oar, would have missed the honours of her beacon-rock.

By wholesome moderate fatigue of the voluntary muscles, the inducement to sensual indulgence is prevented; and thus, we may be led from temptation, by walking or by riding out of it. The temper softens,

and the intellect clears, by exercise of the arms and legs. Men are made wild by not getting their exercise; most children become peevish if kept from their walk; and the convalescent in fever remains infirm of purpose, until, by exercise, his muscles have recovered their tone.

The moral and physical superiority of the Anglo-Saxon race seems principally to depend on the full habitual development of their muscular strength and activity. There is in the writings of Scott and Shakspeare the vigour of the men's own limbs, with a freshness, open as the air, in which they both were bred.

A strict medical caution is needed here, against the over-cultivation of the muscular powers. Many, very many, perish from want of sufficient exercise, which in wilful indolence they renounce. Others, and in this country the instances are by no means rare, hurry themselves into fatal illness by an inordinate use of the muscles placed under their command. The young English gentleman is prone to excess in the indulgence of this, as of his other physical faculties. Should his life be one of leisure, there is generally a period, during which the cultivation of bodily strength by athletic exercises forms his principal, if not his exclusive pursuit. With some it becomes, in truth, an infatuation.

From the waste of power and material involved in this abuse of an excellent principle, fever and permanent general exhaustion often necessarily ensue. Footracing, or "pulling in the boat," when carried to

the extreme, have brought compulsory rest, by chronic palpitation, on many, for the remainder of their lives. Young manly hearts have, in this way, been overstretched, and literally broken. Moreover, gymnastics in excess impair the vigour both of imagination and intellect. The greatest strength of body was never yet associated with the highest and most refined qualities of mind.

Even when not directly injurious to the health, the habit of excessive muscular exertion should be discouraged, from the risks incurred to the general health in the event of its sudden discontinuance. Congestion and inflammation of the vital organs are among the consequences of interruption, in the muscular structure, of actions implying a great habitual waste of the common material of the circulation. It becomes a frequent and especial duty of the physician, to protect his young female patients, not more from their own imprudence, than from the counsels of those who are supposed to know better, in the regulation of their habits of exercise. The sufferer from chronic uterine discharge will often be heard to date her symptoms, from the exhaustion of walks unduly prolonged in her days of early girlhood. Young women, already sinking to the ground from general anæmia, or from the effects of spinal disease, are rated with bustling kindness for never "taking sufficient exercise;" and, under this rebuke, perish miserably, in the endeavour to "walk off" symptoms, which by too much walking have been first induced.

CONCLUDING REMARKS.

In the voluntary muscle man's compound nature receives its closest illustration, and, through it, is best considered. In its self-contracting fibre, there is a type of free will, under a superior agency of control.

The more perfect the organization of the double self-moving animal, the more his movements are made to depend on the central influences of blood and nerve; and, through them, on the several functions and common nutrition of all else in the body. The moral energies of man are developed in close relation with his attribute of muscular power; and in the exercise of neither faculty is he suffered to escape control. In the structure, where his will is to act most free, for action it does not long suffice; and by its means is held responsible for their effect.

Through the double muscles all our social relations are established and maintained; by signs written or by signs spoken; by look or by gesture; yet always by what moves, and is done in the muscle. There can be no evidence of thought to others, excepting that which is afforded by the voluntary muscles of him who thinks; none of volition. Indeed, even the consciousness of thought and volition cannot be retained in connexion with our perishable body, excepting by a continual effort of the muscles employed on the blood and the breath. Even when victorious in the body, over physical trials and infirmities, it is through the

muscle, that mind asserts her separate nature, and vindicates her triumph.

This is not materialism, but our security by reflection against it.

The mind is educated with the muscle,—lives with it, and by it; and in the body never survives its death: but muscle is not therefore mind. The beasts that perish, have muscles like ourselves. That in man the mind should conform with, and be dependent on matter, is the law of his probationary existence. As a compound being, on the Creator's design, he is fashioned, taught, and tried. To distinguish mind, in man, from matter, is to unmake the man.

It is a common error with divines, and much scandal has arisen from the impossible attempt. Man's mind is not a necessary, or fortuitous result of his material life, but an imposed condition of its tenure. It is dependent, as we have seen, at all times, on the muscles for its expression. Mind, if anywhere in the body, is everywhere. How grossly do they err, who, fearing to acknowledge its close, constant, and entire connexion with every drop and particle of the living human frame, would limit its residence to certain parts, as to the brain!

But, if thus localized in the brain; in which brain? for there are two; in which lobe, chamber, or convolution of the brain? for there are many. The brain is but the central union, by double junction, of all the nerves of all the muscles; an appended system of parts, with partial relations, by function, with other structures, and capable of common influences,

only through the blood. It, the brain, may, in truth, be regarded, as the lungs of the nerves; for, in the brain, the nerves are spread out, universally and simultaneously, to the blood, fresh, full, and ventilated from the aortic heart. Without the adjuncts of blood and muscle, we cannot get a notion of the brain, either in structure or function.

Thought and Memory attach to the brain, only as representing the several organs of the body, in combination, by their nerves. There is no more thought in one part of the brain than in another; than in the muscle, whose nerves are there expanded, or in the blood, of which the brain in all its parts consists. On the triple relation of blood and brain, by nerve, with the fibre, the expression of thought is made, in the muscle, to depend; and of thought, in its physical operation, this is all that we are permitted to know.

That the soul, by which we feel and think, is essentially, now, and for ever, distinct from blood, brain, and muscle, we are assured by a Law, which is not of the flesh. And yet, by the flesh, is the law to us made manifest. It has been written, spoken, acted,—still, by those muscles which have been our theme, and from which we now with awe retire. That the Word might to Man be Light, it became itself incarnate.

MEMOIR OF FATAL CONVULSIONS WITH RENAL DISEASE,

READ BEFORE THE COLLEGE OF PHYSICIANS IN 1833.

The following history of certain cases, in which, convulsive fits, rapidly fatal in their termination, were induced by disease of the kidney, has been appended to our treatise, in further support of the great principle of practical medicine, under which, in numerous disorders of the muscle, an authority is asserted for the blood, prior and superior to that of the nerve.

The paper, now first published, was laid before the College of Physicians, in February, 1833; some years after the author had on all possible occasions, pressed on the attention of his pupils, the paramount importance of the blood in the operations of disease. It was read before a large body of the profession, at a time, when to declare this now familiar truth, was to incur the certain ridicule of a large unthinking majority.

Ten years have since elapsed, and cases, too numerous for reference, have been accumulated by the opportunities of practice, exactly similar to those which are here recorded, and confirming the principle, which, by them, was first maintained.

In the pathology of sudden death, as in physiology, and in general medicine, the physician's clue must ever be the blood. It is by this material, abundant and good, in all and each of our structures, that, enjoying health, we live;—it is by a spoiling of the blood, or by its waste, that we sicken and die—we die, it is said, by the brain, heart, lungs, or large blood vessels;—still, by these organs, as influenced by the blood which they contain, and of which, in bulk, they principally consist;—again, by these same organs, as influencing each other through the blood; which in every drop is common to them all, and to the elaboration of which, all structures in all their parts contribute. This one great principle of the science of life, which expresses the universal intermediate agency of the blood, between the external world and all organized structure, as between one structure and another, is now fast establishing itself in the minds of all thinking physicians.

It is with the hope of assisting in the practical illustration of this principle, that I submit to the College, the following report of certain cases, in which a death, more or less rapid, seems to have been transmitted from the kidneys, through the blood, to the other vital structures. The importance of the kidneys is in the constancy of their action, exerted, at all times, on the general circulating mass of the blood.

As it may be said, with truth, that the value, by expression, of the breath, is in the blood that is

breathed upon, so may it be affirmed of the kidney, that its vital influence, as an organ, is not to be estimated by the urine which it separates from, but by the blood which it returns to the circulating torrent. There is no structure in the body, by which the blood is more influenced in quantity as in quality, in its bulk as in its elementary composition, than by the cortical structure of the kidney. No organ, on the other hand, is more influenced by the blood, in quantity and in quality, than is the brain. That the kidney should, through the blood, influence the brain, cannot therefore be matter of surprise to the reflecting practitioner.

Whoever has seen a patient comatose from retention of urine, is aware of this dependence of the brain, for the proper discharge of its function, upon that of the kidney; yet, few care to understand, how rapidly, entirely, and fatally, the gland may influence the nerves in their central assemblage; which is the brain.

For many years past, I have never failed, in the wards of St. George's Hospital, to insist upon the frequent consequence of "head symptoms," so called, upon organic disease of the kidney. Some recent dissections tend very strongly to confirm in my mind this rule of pathology, which, sometimes, finds its illustration in cases of sudden death. I now venture to press the consideration of it on the attention of the numerous professors and authors on Forensic Medicine, whom the late regulations of the Apothecaries' Company have called into active existence.

Under the date of August 13, 1831, in a manuscript report of dissections conducted under my own eye, I find an account of the examination of a middle-aged female patient, Mary Ranson, admitted under my care into St. George's Hospital, two days before her death. The case had been reported, on admission, as one of "pains, with swelling of the limbs." The complexion of this patient was unusually pallid, and her general appearance very sickly. On the morning subsequent to her admission, she was seized, by the nurse's account, with a "fit."

Later in the day, she was found, by me, insensible, with stertorous breathing; and on the following morning she expired. Her friends reported her to have had a "paralytic attack," three weeks previous to her admission; and, that she had been "very low" for the last three months of her life.

As she had died "apoplectic," the head was first examined. There was no effusion,—no lesion,—nothing on which to remark, excepting that the brain was pale and bloodless. The large veins and sinuses were surprisingly empty of blood; there was no fluid in the ventricles. We proceeded immediately, in the recollection of similar cases, to examine the kidneys. The cortical structure in both these glands had given place to a smooth firm substance of a light brown colour, and presenting no trace of organized structure. Of tubular structure there was scarcely a trace in either kidney. The mammillary processes had almost entirely disappeared. There was a large irregular many-pouched cyst on the surface of the left kidney,

communicating by its many locular divisions with the pelvis of the organ, and containing a limpid fluid.

The lungs were loaded with air and serum, but were otherwise healthy. The heart was sound. About six ounces of a light red fluid were found in the pleura. The cervix uteri was nearly destroyed by ulceration. In this case, the store of blood, no doubt, had been greatly wasted by the uterine discharges; of which no mention had been made by the patient or her friends; but I have no hesitation in ascribing the state of circulation by which the fits were induced, primarily and principally, to the disease, by structural alteration, of the kidneys.

In the case of a young gentleman, by which I was deeply interested, in the winter of 1832, there had been great and constant languor, hesitation of manner, and loss of appetite, with a tongue always furred, and a dull yellow hue of countenance, for some months previous to his death on the 6th of the present month. He had, at times, complained much of "ague," meaning, by this phrase, a periodical nightly oppression on the chest. A week before his death, having walked out with his family, he complained, on his return home, of "shortness of breath."

The next morning, he was found insensible in his bed, with stertorous breathing. So urgent were the symptoms of what appeared to be "pressure on the

brain," that not less than fifty ounces of blood were taken from his arm and by cupping, by the medical friends first in attendance. He in some measure recovered his senses, and lived without fits or paralysis for nearly a week. Under symptoms of returning stupor, a small quantity of blood was again take from the arm. All the blood, with the exception of a small portion of that last drawn, was thickly coated with "buff." His breathing, after a time, became difficult, and he expired on the morning of the sixth day from the date of the apoplectic seizure.

In the brain, there was no lesion,—no effusion: the veins and sinuses, although empty or nearly so, were of surprising capacity; and this remark was extended by Mr. Samuel Lane, who conducted the examination with unusual care, to all the veins of the body, excepting those of the kidney. The kidneys, to which, from past observations, we anxiously directed our attention, were found to be shrunk within one-fourth of their average size; and of their bulk thus diminished, scarcely any part presented the appearance of healthy cortical structure. In the bladder were several ounces of a pale fluid, which coagulated on the application of heat and nitric acid.

The lungs were much loaded with a pale frothy serum, and nearly a pint of a serous fluid was found in the left side of the chest. The heart was large but healthy, with long coagula produced into its right cavities from the jugular veins, which were of immense capacity. Here, then, was fatal apoplexy; yet with no lesion of the substance of the brain, no effusion on

its surface. The disease, inducing the apoplexy, was one, not of the brain, but of the kidney.

In this case, as in that of a man named Hoben, admitted under my care into St. George's Hospital in November, 1832, whose kidneys were found to be very small, red, and granular, the blood taken during life was exceedingly buffy, although no traces of what is termed inflammatory action were observed in any of the structures after death. There had been great and constant pain in the chest, extreme dyspnœa, with cramps, pain in the head, and occasional bleedings from the nose.

I never remember to have seen more buffy blood than that which was taken from a patient whom I attended with Mr. Morgan, of Chapel Street, in the autumn of 1831, and who had laboured for some days under suppression of urine, all but complete. There was, in this case, hiccough, sickness, and vomiting of a green fluid, with great depression of manner, yet with no evidence, by symptoms, of inflammation. On the night before I directed him to be bled, he was suddenly attacked by giddiness and other alarming sensations in his head. This attack was described as "a sort of fit," and had evidently alarmed him very much.

[A third case, in which sudden death supervened on renal anasarca, with epileptic seizures, and in which, the brain, after death, although pale and empty of blood, was found to be sound in structure and free from effusion, has been already described in page 50 of the preceding treatise.]

In a patient named Reddish, a gentleman's servant, who died, anasarcous and dropsical, while under my care in St. George's Hospital, on February 17, 1833, both kidneys were found to be diseased throughout their entire structure. The cortical part had been superseded by a dark grumous pulp without any apparent organization, and the tubular portion could scarcely be distinguished from this outer pulpy mass, excepting by its somewhat firmer texture and darker colour. No mammillary processes could be demonstrated. This man had been attacked by three violent convulsive fits, in rapid succession, a week before his death.

There was no lesion of the brain, no effusion on its surfaces, or in its ventricular cavities. The fits and all other symptoms in this case, terminating by death, were, in my opinion, consequent on disorganization of the kidney. Urine was not secreted,—the blood was not elaborated,—and so, by the circulation, not life, but principles fatal to it, were, in the end, conveyed to the brain, as to every structure of the body.

Lastly, on February 15, 1833, a boy was examined in the dead-house of St. George's Hospital, who was reported to have "died suddenly." On the preceding evening, an alarm had been given by the nurse, that "he had been attacked by a fit, and was dying." Before the house-surgeon's arrival, the boy was dead. The brain was without lesion or effusion. Its vessels and membranes were everywhere sound. Of what, then, did this lad die? He had been admitted into

the hospital, with incontinence of urine; and a blister had been applied to the sacrum. The urine was albuminous, but no other symptoms had been remarked. He was healthy in his appearance,—lively and active in his habits. On further examination, it appeared, that both kidneys had been converted into suppurating cysts, which were subdivided into a number of smaller pouches communicating with each other and with the pelvis of the organ. The cortical structure had almost disappeared. The heart and lungs were sound.

By these and by many similar cases which might be brought forward, the importance of the kidney as an organ of the circulation, influencing the blood's current both in volume and quality, is fully established. On the blood, in quality as in quantity, the functions of the brain, heart, and lungs, at every instant depend. It is not proposed here to consider the particular changes effected in the blood's composition by such morbid alterations in the structure of the kidney as have been just described. My object, at present, is to insist generally, on the constant, rapid, and vital dependence of the brain, lungs, heart, and blood-vessels, in their function, on that of the kidney, as established through the blood, and illustrated by the morbid anatomy of the urinary gland. It is with sincere pleasure, as a Fellow of this College, that I recognise in Dr. Prout and Dr. Bright, our best authorities in this branch of medicine. Dr. Bright, in his superb and elaborate work on the Pathology of the Brain, has noticed several cases of arachnitis

with effusion, in coincidence with certain diseases of the kidney. In the instances of renal disorder to which I have directed the attention of the College, there was no alteration in the structure of the brain, or effusion on its surface.

My inference from these cases of sudden death from renal disease coincident with integrity of the cerebral structures, is that, in the treatment of epilepsy, anasarca, and hydrothorax,—of apoplexy, and disorders of the pulse and breath,—the structure and function of the kidneys should be taken well into the account; moreover, that in all dissections of persons who have "died suddenly," the kidney should be carefully examined;—and this, whether the heart, brain, lungs, and large blood-vessels be sound or not; for disease of the kidney is often the cause of organic disease in these vital structures; influencing their nutrition through the common material of the blood, upon the elaboration of which, the kidney is unceasingly employed.

As the influence of the kidney upon the assemblage of nerves, constituting what is termed the brain, is established by effects, violent and sudden, as those of epilepsy and apoplexy, it becomes a question, whether the periodical function of sleep may not be, in some measure, determined by the renal glandular agencies in constant operation on the blood. I cannot help remarking, in conclusion, that, five years ago, scarcely any physician would have thought of explaining the most urgent cerebral and thoracic symptoms, by morbid changes in the structure of the kidney.

That no pathologist will in future neglect such inquiry, is one of the many encouraging intimations that physic is at last becoming science, and that its practice will henceforth rest on a basis less questionable than the practitioner's individual assertion.

February 20, 1833.

NOTE.

Some days after this paper had been laid before the College, I found that Dr. Elliotson had stated, in a lecture on apoplexy, delivered by him at the London University, and published in the *Medical Gazette* of February 23, 1833, "that he did not remember to have opened more than one person who had died of apoplexy after a suppression of urine, and in that person there was neither fulness of the vessels nor was there effused any serum in or upon the brain." It was not until within the last few months, that I became aware that Dr. Christison had previously alluded to the same occasional coincidence of sound brain with diseased kidneys in cases of fatal apoplexy. By neither of these distinguished physicians has it been proposed to consider the cerebral symptoms as a direct consequence, by prejudice to the blood, of the renal glandular disease.

In a Gulstonian Lecture, published in the *Medical Gazette* of June 22, 1833, four months after the public reading of this paper at a meeting of the College of Physicians, attention is directed to certain fatal cases of renal disease, associated with coma, and other evidences of cerebral disturbance; in which, on examination after death, the brain was found free from effusion, and healthy in its structure. In attempting an explanation of these cases, the lecturer offers a surmise, that the head symptoms may have

depended on an impaired condition of the blood, resulting from organic disease of the renal excretory glands, yet never hints at the previous enunciation of this important practical truth by the author of the foregoing paper.

HOT-AIR BATH.

In furtherance of the advantages which may be obtained from the hot-air bath, as a remedial agent in disease, a sketch is here subjoined of the simple apparatus long used for this purpose in the wards of St. George's Hospital. It has been very frequently employed by the author in the treatment of rheumatic fever and of chronic rheumatism; likewise, in cases of anasarca and dyspnœa, consequent on interrupted glandular excretion. It is recommended to the practical physician, by effects of relief remarkable as those which warrant the use of opium, calomel, or the lancet.

Fig. 1.

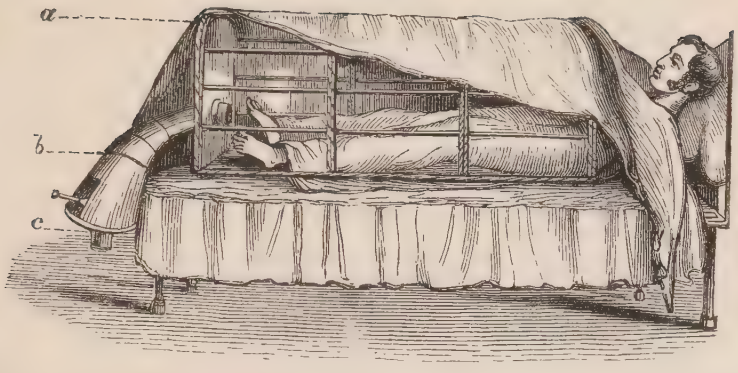

Fig. 1.—*a*, Wicker cage, jointed in three divisions, and closed at one end.

b, Tin funnel-shaped Chimney, conducting the heated vapour from spirit lamp, within the wicker cage and beneath the bed-clothes.

c, Spirit Lamp, introduced by aperture at lower end of Tin Chimney.

Fig. 2.

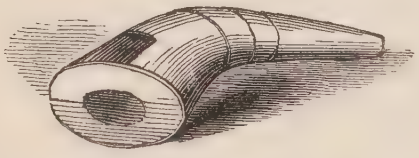

Fig. 2.—Tin Chimney, with circular aperture in base, within which the Spirit Lamp is suspended.

Fig. 3.

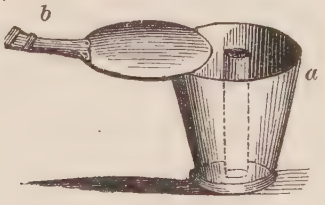

Fig. 3.—*a*, Tin Cup, containing spirit of wine, with hollow tube in centre, open above and below, for the admission of air.

b, Moveable lid of Cup, to regulate the admission of air.

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